Essays on the Political Economy of Labor Market Regulation

by

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Abstract

The stringency of employment protection regulations varies substantially across countries. This thesis studies three mechanisms that can help explain the extent and persistence of this variation. The first chapter explores the ability of employment protection to generate its own political support. Using a version of the Mortensen-Pissarides model, I show that the presence or absence of this ability depends crucially on the features of wage determination. Under the standard assumption of continuous time Nash bargaining, workers value employment protection because it strengthens their hand in bargaining. Workers in high productivity matches benefit most. Yet employment protection shifts the distribution of match-specific productivity toward lower values and thus away from the supporters of regulation. Bilaterally inefficient separations are a feature of wage setting that can partially reverse this negative result. Now workers value employment protection because it delays involuntary dismissals. Workers in low productivity matches gain most since they face the highest risk of layoff. The shift of the productivity distribution toward lower values then becomes a shift toward supporters of employment protection. The second chapter puts forward a simple Ricardian argument suggesting that trade integration can sustain diversity in employment protection regulations. Trade integration enables a rigid country to specialize in activities less dependent on flexibility, mitigating the cost of rigidity. Conversely, it makes a flexible country less willing to become rigid, since doing so means forgoing the gains from trade induced by diverse regulation. This argument is evaluated in a dynamic model of labor turnover and employment protection. The third chapter presents an argument according to which employment protection is a policy that is difficult to introduce. If a country decides to introduce employment protection, it is reasonable to assume that firms can adjust employment levels before protection is actually implemented. Firms then have an incentive to dismiss some workers today in order to avoid high employment protection in the future. Anticipating this, these workers may oppose the introduction of employment protection. Delayed implementation can give rise to situations in which both low and high employment protection are stable political outcomes.

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Introduction

The stringency of employment protection regulations varies substantially across countries. This thesis studies three mechanisms that can help explain the extent and persistence of this variation.

The first chapter explores the ability of employment protection to generate its own political support. Using a version of the Mortensen-Pissarides model of job creation and destruction, I show that the presence or absence of this ability depends crucially on the features of wage determination. Under the standard assumption of continuous time Nash bargaining, workers value employment protection because it strengthens their hand in bargaining. Workers in high productivity matches see their bargaining position enhanced most significantly. Furthermore, their low likelihood of becoming unemployed shelters them from the adverse consequences of employment protection. Yet by reducing turnover employment protection shifts the distribution of match-specific productivity toward lower values. This is a shift toward workers that have little taste for employment protection. Bilaterally inefficient separations are a feature of wage setting that can partially reverse this negative result. Now workers value employment protection because it delays involuntary dismissals. Workers in low productivity matches stand to gain the most since they face the highest risk of layoff. Again employment protection shifts the productivity distribution toward lower values. However, now this is a shift toward ardent supporters of employment protection.

The second chapter puts forward a simple Ricardian argument suggesting that trade integration can sustain diversity in employment protection regulations. Trade integration enables a rigid country to specialize in activities less dependent on flexibility, mitigating the cost of rigidity. Conversely, it makes a flexible country less willing to become rigid as well, since doing so means forgoing the gains from trade induced by diverse regulation. This argument is both generic and static: it makes no reference to specific features of employment
protection nor to the dynamics of specialization. How does this generic and static argument fare in an explicit dynamic model of labor turnover and employment protection? Modelling dynamics highlights a second link between trade and the cost of rigidity: employment protection slows down the reallocation needed to realize the potential gains from trade created by integration. The model makes sharp predictions concerning the effect of integration on the distribution of the cost of rigidity. Perhaps surprisingly, workers and firms at large are insulated from the slowdown and only subject to the Ricardian mechanism. The slowdown exclusively concerns agents in relocating sectors: firms want to close quickly and demand deregulation, workers strive to delay dismissal through tighter restrictions. Through the distribution of political power, these implications of the model map into rich predictions concerning the effect of trade integration on the overall support for rigidity. Differences in employment protection across countries appear to be quite persistent over time.

Chapter 1 examines the view that differences in employment protection persist because high employment protection creates a mass of workers in favor of maintaining high protection because deregulation would mean that they would lose their jobs. According to this view, employment protection is a policy that is difficult to deregulate. Chapter 3 analyzes a different view of this persistence, namely that employment protection is a policy which is difficult to introduce. If a country decides to adopt employment protection, it is reasonable to assume that firms have ample opportunity to adjust employment levels before protection actually comes into effect. In particular, firms would have an incentive to dismiss some workers today in order to avoid problems with high employment protection in the future. Anticipating this, workers whose situation is already precarious may not find it in their best interest to support the introduction of employment protection in the first place. The main result of the paper is that delayed implementation may give rise to situations in which both low and high employment protection are stable political outcomes.
Chapter 1

Does Employment Protection Create Its Own Political Support? The Role of Wage Determination

Most countries have adopted regulations that make it costly for employers to dismiss workers. The extent of such regulations varies substantially across countries. Differences in employment protection regulations also appear to be quite persistent over time. It is often argued that employment protection has large impacts on labor market performance.¹ What is the source of these differences in regulation?

While employment protection legislation exhibits substantial persistence, it is not immutable. Reforms in either direction are a regular occurrence. Moreover, attempts of reform are often accompanied by severe political conflict.² This suggests that it is useful to view the extent of employment protection within a country as the outcome of a political process. The question then becomes: what are the sources of variation in the political support for employment protection across countries?

¹Botero et al. (2003) recently constructed indicators of legal protection against dismissal for a sample of 85 countries. The World Bank (2003) uses their methodology to obtain indicators for a sample of more than 130 countries. There is little systematic evidence on persistence, Blanchard and Wolfers (2000) make an attempt to construct time series of the stringency of employment protection for a group of OECD countries. The effect of employment protection on labor market performance is quite controversial, Addison and Teixeira (2003) survey the available evidence.

²Bertola, Boeri, and Cazes (1999) provide an overview of major changes in employment protection regulations for a group of OECD countries. Krueger (2002) provides a vivid account of the political conflict induced by a recent proposal to relax firing restrictions in Italy.
In this chapter I will explore a very parsimonious explanation for the extent and persistence of this variation: the possibility that employment protection has the ability to generate its own political support. If high employment protection in the past induces strong support for employment protection today, this provides a mechanism toward amplification and persistence that could already go a long way in accounting for the variation in employment protection across countries.

Are there mechanisms that allow employment protection to create its own political support? The answer will also contribute to an understanding of the current debate about labor market reform. In particular, the notion that employment protection creates its own political support is implicit in some arguments put forward in this debate. Consider for example the popular advice that reforms should leave existing employment relationships untouched. The idea is that the old stock of employment relationships will gradually disappear and eventually all jobs are subject to less employment protection. But for this scheme to work, it must be the case that workers in the new flexible economy display less of a taste for employment protection than the workers in the pre-reform economy, for otherwise the former would prefer a return to the old ways.

I will examine the ability of employment protection to create its own political support within a version of the Mortensen-Pissarides model of job creation and destruction (Mortensen and Pissarides (1994), Pissarides (2000)). The primary focus will be on the support provided by employed workers, since they are the principal beneficiaries of employment protection. I will show that the answer depends crucially on the way in which wages are determined: depending on the features of wage setting, the support provided by employed workers can be increasing or decreasing in the extent of past employment protection.

The Mortensen-Pissarides model is a natural starting point: it has become the standard

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3"One possibility to overcome this stalemate may be to leave existing contracts intact, but to allow current ‘outsiders’ to opt out of existing arrangements and conclude mutually beneficial contracts with employers willing to do so." (IMF (1999), p.121)

The type of reform implemented by many Western European countries over the last two decades does not quite follow this advice. This type of reform tends to leave the regulation of standard (permanent) employment contracts unchanged but reduces restrictions on nonstandard employment such as fixed-term contracts. Such a reform will not lead to the gradual disappearance of highly protected employment relationships. Instead standard and nonstandard forms of employment will coexist. See Blanchard and Landier (2002) for an analysis of the economic effects of this type of reform.
theory of equilibrium unemployment and has been a popular tool to study the effects of various policies, including employment protection, on labor market performance. It easily accommodates different modes of wage determination. The model also generates plausible and intuitive differences among workers in their preferences for employment protection. Workers are identical. However, at a point in time identical workers may find themselves in very different positions. First, their employment status may differ: some workers have jobs while others are unemployed. Second and crucial for my purposes, employed workers may find themselves in very different situations as well. Firm-worker matches are subject to idiosyncratic productivity shocks. As a consequence, some employed workers are in matches with high productivity while others are employed in low productivity matches. Higher match-specific productivity makes it less likely that a worker will be dismissed in the near future and thereby affects his taste for employment protection.

How is employment protection introduced into this model? The literature has drawn a distinction between two dimensions of employment protection. First, severance payments require the firm to make a transfer to the worker upon separation. Second, a firm typically has to obey a set of administrative restrictions and procedures if it wants to dismiss workers. These restrictions are usually modelled as wasteful firing costs (a tax on dismissals that is a pure deadweight loss). I allow employment protection to come in both guises.

How could employment protection create its own political support within the Mortensen-Pissarides model? I show that across different modes of wage setting one thing remains unchanged: employment protection shifts the distribution of match-specific productivity toward lower values. This is intuitive: employment protection slows down the process of job creation and destruction. As a consequence workers and firms will be less well matched.

Now suppose workers in matches with low productivity are the most ardent supporters of employment protection. Then strict employment protection in the past will place many workers into low productivity matches. These workers in turn provide strong support for employment protection today. Exactly the opposite will be true if workers in matches with high productivity are the most eager supporters of employment protection. A larger number

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4See Garibaldi and Violante (2002).
5The relative importance of the two components is not clear. For the case of Italy Garibaldi and Violante estimate that for a blue collar worker with average tenure the transfer component is twice as large as the wasteful component. It should be safe to say that both components are economically significant.
of workers in low productivity matches then translates into low support for employment protection.

The importance of wage setting is now easy to appreciate: it determines whether workers in high productivity matches or their counterparts in matches with low productivity stand to gain most from employment protection.

At a fundamental level wage setting determines the channels through which employed workers may gain from employment protection. It is often pointed out that employment protection enhances the bargaining power of workers, enabling them to ask for higher wages. This first channel will be referred to as the *appropriation* effect of employment protection.

The second channel that I will introduce is perhaps more subtle. Employment protection prolongs the duration of jobs. Is this of any value to the worker? The answer is no if separations are bilaterally efficient and voluntary from the perspective of the worker. In this case the timing of separation is optimal from the worker’s viewpoint and there are no gains from manipulating job duration. But the answer changes if wages are determined such that separations are bilaterally inefficient and premature from the perspective of the worker. (From now on I will refer to this constellation as bilaterally inefficient separations, it being understood that it is the worker who is dismissed involuntarily.) Now the worker would ideally want to manipulate the timing of separation directly. However, being unable to do so he stands to gain if this goal is achieved indirectly through an increase in employment protection. This second channel will be referred to as the *prolongation* effect of employment protection.

These are the two channels through which employed workers can gain from employment protection. But the possibility of gains through one or both of these channels does not imply that employed workers will always push for more employment protection. This is because in general equilibrium employment protection makes unemployed workers worse off. The utility of the unemployed pins down the alternative wage of employed workers. By reducing this alternative wage, employment protection will adversely affect the employed. This will be referred to as the *backlash* effect of employment protection.\(^6\) Once again wage

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\(^6\)See for example Lindbeck and Snower (1988) and Blanchard and Portugal (2001).

\(^7\)As I will discuss in detail later, it would not be correct to refer to the backlash effect as the general equilibrium effect of employment protection. It is a part of the general equilibrium effect but not the entire general equilibrium effect: the prolongation effect also has a general equilibrium component. Similarly while the appropriation effect is a partial equilibrium effect, it is not the
setting plays a crucial role: it determines how sensitive the utility of employed workers is to changes in the utility of unemployed workers, and how this sensitivity varies with the level of match-specific productivity.

The mode of wage setting most commonly employed in versions of the Mortensen-Pissarides model is continuous time Nash bargaining: the surplus of the match is split between the worker and the firm according to a Nash sharing rule at all times. It is useful to consider this mode of wage determination for two reasons. First, it has been in widespread use to examine the economic implications of employment protection. Thus the examination of how continuous time Nash bargaining shapes the political support for employment protection is an interesting endeavor in its own right. Second, continuous time Nash bargaining is useful from an analytical perspective because it isolates one of the two channels through which workers gain from employment protection. Since separations are bilaterally efficient the prolongation effect is not active. Employment protection will still prolong the duration of jobs, but this is not valued by workers. This leaves only the appropriation effect as a source of gains from employment protection.

Under Nash bargaining employment protection enhances the bargaining position of the worker both by improving his outside opportunity and by reducing the outside opportunity of the firm. It turns out that workers in high productivity matches gain at least as much from this improvement in their bargaining position as workers in matches with low productivity. At the same time they are less affected by the fall in the utility of the unemployed, because they are less likely to face unemployment in the near future. Thus workers in high productivity matches are the primary beneficiaries of employment protection. It follows that employment protection is not able to generate its own political support, since it shifts the distribution of productivity toward lower values.

Interestingly, this argument extends beyond the realm of employment protection. Under Nash bargaining the worker receives a share of the surplus of the match. Many authors have assumed that labor market regulation enhances the bargaining position of workers.

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8That bargaining occurs at all times during the life of the match is important to obtain bilaterally efficient separations. In Blanchard and Portugal (2001) Nash bargaining takes place only once, in the instant after the firm has hired the worker. It is assumed that the wage chosen at this point is not renegotiated in response to shocks to match-specific productivity, so separations are in general bilaterally inefficient.
by increasing the share of the surplus that workers are able to appropriate. I show that policies boosting surplus appropriation are unable to create their own political support for the same reason as employment protection: they are supported by workers in high productivity matches but shift the distribution of productivity toward lower values.

The inability of employment protection to create its own political support under the standard assumption of continuous time Nash bargaining is the first point I would like to make in this chapter. It naturally leads to the following question: What features of wage setting will enable employment protection to generate its own support? I will show that bilaterally inefficient separations have some potential in this respect.

I introduce bilaterally inefficient separations in a very simple way by assuming that there is a wedge between the wage received by an employed worker and his alternative wage that cannot be negotiated away. As discussed above, this activates the prolongation effect as a channel through which workers can benefit from employment protection. It is easy to see that workers in low productivity matches gain most from an increase in job duration. In particular, a worker on the margin of being dismissed experiences the gain from delayed separation immediately. Conversely, for a worker in a high productivity match it is unlikely that he will face dismissal in the near future, so for him the gains from delayed separation are rather remote.

However, it is not generally true that workers in low productivity matches lose most from a decrease in employment protection. In particular, a worker on the margin of being dismissed suffers little from deregulation, simply because that worker would have immediately lost his job even in the absence of deregulation. As a consequence, the losses from a reduction in employment protection are not monotone in productivity. Thus the argument that bilaterally inefficient separations enable employment protection to generate its own support is theoretically not as clear cut as the negative result in the case of continuous time Nash bargaining.

To my knowledge the present analysis is the first to consider the structure of political support for employment protection in the standard Mortensen-Pissarides model with

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9Mortensen and Pissarides (1999a) consider a model in which collective bargaining enables monopoly unions to determine the share of workers in the surplus. Blanchard and Giavazzi (2003) study macroeconomic effects of deregulation in product and labor markets, taking labor market regulation to determine the share of workers in bargaining.
continuous time Nash bargaining. More generally, it is the first to examine the ability of employment protection to generate its own political support in a setup where workers benefit through an enhancement of their bargaining position rather than through longer job duration.

On the other hand, I'm not the first to argue that employment protection may generate its own political support when workers benefit through an increase in job duration. Here my contribution is more subtle. Saint-Paul (2002b) recently obtained this result in a model of job creation and destruction with vintage capital. He emphasizes that it is the presence of labor market rents (defined as the utility difference between employed and unemployed workers) that makes job duration valuable and thereby enables employment protection to generate its own political support. Yet my analysis of continuous time Nash bargaining shows that rents per se cannot be the driving force: here workers earn rents but they do not value job prolongation. Instead I trace the value of job prolongation more narrowly to bilaterally inefficient separations: not rents as such but bilaterally inefficient separations may enable employment protection to generate its own political support.\textsuperscript{10}

Other closely related research includes Vindigni (2002), who examines how the extent of idiosyncratic uncertainty affects the political support for employment protection. Koeniger and Vindigni (2003) develop a model in which more regulated product markets are associated with stronger support for employment protection. Boeri and Burda (2003) take the extent of firing costs as given and examine how it influences the political support for rigid modes of wage determination. Boeri, Conde-Ruiz, and Galasso (2003) provide a political economy analysis of the trade-off between employment protection and unemployment benefits.

More generally this chapter is part of a strand of literature that has examined whether various policies have the ability to create their own political support. Hassler et al. (2001) are concerned with unemployment insurance, Coate and Morris (1999) consider policies such

\textsuperscript{10}Saint-Paul does not discuss the role of bilaterally inefficient separations. In fact, in his model wages are determined by continuous time Nash bargaining (specifically, the special case in which the worker is able to appropriate the entire surplus). As a consequence separations should be bilaterally efficient and longer job duration should not be valued. In his analysis bilaterally inefficient separations arise due to an error in computing the wage implied by bargaining: in some instances the calculated wage is too high, leading to separations that are premature from the perspective of workers.
as subsidies and price controls that favor certain sectors of the economy. Both Benabou (2000) and Hassler et al. (2003) deal with income redistribution. Acemoglu and Robinson (2001) develop a theory in which the ability of inefficient redistributinal policies to create their own political support enables these policies to survive despite the availability of more efficient modes of redistribution.

The remainder of the chapter is organized as follows. In section 1.1 I introduce a version of the Mortensen-Pissarides model of job creation and destruction. The political setup is described in section 1.2. Section 1.3 analyzes which workers gain most from employment protection. In section 1.4 I analyze how this translates into the ability of employment protection to generate its own political support. Section 1.5 concludes.

1.1 A Model of Job Creation and Job Destruction

In this section I introduce a version of the Mortensen-Pissarides (1994) model of job creation and destruction. The basic structure of the model economy is described in subsection 1.1.1. The specification of wage setting is of central importance and is described in subsection 1.1.2. I start with the standard assumption about wage determination in the Mortensen-Pissarides framework: continuous time Nash bargaining. Then I introduce a specification of wage setting that will induce bilaterally inefficient separations. The general specification of wage setting used in this chapter will nest both Nash bargaining and bilaterally inefficient separations.

The economy will be subject to different types of labor market regulation. The focus is on employment protection both in the form of wasteful firing costs and severance payments. For the purpose of comparison, I also allow labor market regulation to enhance the bargaining position of workers by increasing the share of the match surplus that workers are able to appropriate. Subsection 1.1.3 summarizes the different types of labor market regulation that affect the economy.

The model economy is assumed to experience a single unanticipated change in labor market regulation at time $t = 0$. Here this change is taken as exogenous, in the following sections it will be the outcome of a political decision. Apart from this single change both regulation and all model parameters are constant throughout. The labor market regime prevailing before the change is denoted at $\lambda_0$, and at time $t = 0$ the economy is assumed to
be in the steady state induced by this regime. The new labor market regime is denoted as \( \lambda \).

In subsection 1.1.4 I analyze the partial equilibrium separation decision and examine how it depends on the features of wage setting. In subsection 1.1.5 I compute the general equilibrium path of the economy after the change in labor market regulation. In particular, I will compute the utility of workers at time \( t = 0 \) as a function of the continuing level of labor market regulation. Later this function will represent preferences for labor market regulation in the political economy analysis.

In subsection 1.1.6 I will compute the steady state induced by initial labor market regulation \( \lambda_0 \). Later in the chapter it will be shifts in this initial distribution of productivity that will allow initial regulation to affect the political outcome at time \( t = 0 \).

1.1.1 Basic Features

There is a continuum of infinitely lived workers of mass one. At a point in time a worker is either employed or unemployed. The production structure of the economy consists of many firm-worker matches, each composed of one worker and one firm. At each point in time some existing firm-worker matches are destroyed and some new matches are created.

Creation. Creating a new match is costly. In particular, a firm hiring a worker at time \( t \) incurs costs \( c(h(t)) = c_I + c_S(h(t)) \) where \( h(t) \) is the hiring rate at time \( t \). The first component \( c_I > 0 \) is a fixed cost of investment. The second component \( c_S(h(t)) \) is a reduced form specification for the search costs implied by a constant returns to scale matching function.\(^{11}\) Search costs are strictly increasing and satisfy \( \lim_{h \to \infty} c_S(h) = +\infty \). Intuitively, at times of intense hiring it is more difficult for firms to find workers, leading to higher search costs.

\(^{11}\)Let \( H = m(u, v) \) where \( H \) is hiring, \( u \) is unemployment, \( v \) is the number of vacancies and \( m \) is a concave constant returns to scale matching function increasing in both arguments. Assume that a vacancy is associated with costs \( c_S \) per unit of time. Let \( \theta = \frac{v}{u} \) be labor market tightness and let \( h = \frac{H}{v} \) be the hiring rate. By homogeneity of degree one \( h = m(1, \theta) \) and one can invert this relationship to obtain a function \( \theta = \Theta(h) \) where \( \Theta \) is increasing. Expected search costs associated with a new vacancy are then given by \( \frac{c_S}{m(\frac{h}{v}, 1)} = \frac{c_S}{m(\frac{1}{\theta}, 1)} \). Also see Pissarides (2000).
Destruction. A firm-worker match has a strictly positive scrapping value \( X \). I assume that \( X \leq c_I \), so at best the fixed cost of investment can be recouped. The scrapping value is divided between the worker and the firm in the following way. The firm has to pay firing costs of \( \gamma(\lambda)X \). The fraction paid as firing costs \( \gamma(\lambda) \in [0, 1] \) is determined by labor market regulation \( \lambda \). The restriction \( \gamma(\lambda) \leq 1 \) reflects the implicit assumption that the firm cannot be forced to relinquish more than the scrapping value.\(^{12}\) The worker receives a fraction \( \rho \) of firing costs as a transfer \( T(\lambda) \equiv \rho \gamma(\lambda)X \) where \( \rho \in [0, 1] \). This is the severance payment. The remaining fraction of firing costs \( (1 - \rho)\gamma(\lambda)X \) is wasted. It is useful to define \( R(\lambda) \equiv \rho \gamma(\lambda)X + (1 - \gamma(\lambda))X \) as the part of the scrapping value that remains after wasteful firing costs have been deducted. I assume that the share of firing costs paid as severance payments \( \rho \) is fixed in the sense that it is not affect by labor market regulation. In the extreme case \( \rho = 0 \) severance payments \( T(\lambda) \) are zero and the only effect of firing costs is to waste part of the scrapping value. In the other extreme \( \rho = 1 \) there is no waste, that is \( R(\lambda) = X \), and all firing costs go the worker in the form of the severance payment \( T(\lambda) \).

Idiosyncratic Uncertainty. All new matches start with the same productivity \( y_0 > 0 \), but subsequently they are subject to idiosyncratic productivity shocks. I will deviate from Mortensen and Pissarides (1994) by using a different stochastic process for match productivity. The purpose of this deviation is to capture the idea that workers in matches with high productivity face a lower incidence of unemployment.

In the original Mortensen-Pissarides model productivity changes occur with a fixed Poisson arrival rate. If a change occurs, the new productivity is drawn from a fixed distribution with distribution function \( F(y) \). Destruction occurs if the new productivity falls short of the reservation productivity. This process exhibits persistence because the current productivity applies until a change occurs. But conditional on change, the old productivity does not affect the distribution from which the new productivity is drawn. This implies that all workers are equally likely to become unemployed, regardless of whether current match-specific productivity is high or low. In this specific sense the persistence of match productivity in the original Mortensen-Pissarides model is degenerate. Their stochastic

\(^{12}\)It is reasonable to assume that there is an upper bound on the amount of firing costs that can be extracted from a firm, and this specification generates this upper bound in a natural way.
process could be generalized by assuming that the new productivity is drawn from a
distribution with distribution function $F(y, y')$ and that the old productivity $y'$ shifts $F(y, y')$
toward larger values. This would insure that workers in high productivity matches are less
likely to become unemployed. I will achieve the same goal in a more tractable way by
assuming that match productivity follows a geometric Brownian motion.\textsuperscript{13} In addition I
allow for the possibility that productivity jumps to zero with Poisson arrival rate $\delta \geq 0$.\textsuperscript{14}
In Appendix 1.6.1 I describe the stochastic process of match productivity more formally. In
particular I state the conditions on the parameters that insure the existence of a stationary
distribution, which I assume to be satisfied throughout this chapter.

\textbf{Transitional Dynamics.} Recall that at time $t = 0$ the economy experiences an unan-
ticipated change in labor market regulation. No further changes in labor market regulation
or other parameters of the model are expected after time $t = 0$. A convenient feature of
the Mortensen-Pissarides model is that it has very simple transitional dynamics.\textsuperscript{15} In par-
ticular both the hiring rate and the utility of the unemployed immediately jump to their
new steady state values. Only the level of employment and the production structure adjust
slowly to the new steady state.

\subsection*{1.1.2 Wage Determination}

First I will compute the joint value of a match. Then I will discuss how wage setting
determines the way in which this value is split between the firm and the worker.

As discussed at the end of the previous section, the utility of unemployed workers is
constant along the equilibrium path; let $U$ denote this constant utility level. In the event of

\textsuperscript{13}Bentolila and Bertola (1990) first employed a geometric Brownian motion to examine the effects
of firing costs in a partial equilibrium setting. Vindigni (2002) recently utilized the geometric
Brownian motion to examine how the extent of idiosyncratic uncertainty affects the political support
for employment protection.

\textsuperscript{14}This addition is made for two reasons. First $\delta > 0$ insures the existence of a stationary produc-
tivity distribution irrespective of the parameters of the geometric Brownian motion. With $\delta = 0$ a
stationary distribution may still exist, but only if the trend $\mu$ is not too large relative to volatility $\sigma$.
See appendix 1.6.1 for details. Second, with this addition my specification includes the productivity
process of Saint-Paul (2002b) as a special case. In his model productivity is constant and exogenous
destruction occurs at rate $\delta$. However, the productivity of new matches is growing at rate $g$. This
is isomorphic to the special case of my specification in which volatility is zero, productivity falls at
rate $g$ and exogenous failure occurs at rate $\delta$ (one also needs to replace the subjective discount rate
$r$ by $r - g$ if one wants to get the comparative statics with respect to $g$ correctly).

separation an employed worker receives the utility of an unemployed worker and collects the
severance payment, so his total outside opportunity is given by \( U + T(\lambda) \). The firm receives
the remaining scrapping value less the severance payment, that is \( R(\lambda) - T(\lambda) \). The sum
of the two outside opportunities will be referred to as the joint outside opportunity and is
given by \( V \equiv U + R(\lambda) \).

Notice that the firm-worker match operates in a constant environment: outside opportuni-
ties do not change over time. As a consequence the criterion for separation will be
time invariant as well. My assumptions on wage setting will be such that the optimal pol-
icy always takes the following form: separation occurs if productivity hits or falls below
a reservation productivity \( y \). In this subsection I will take the reservation productivity as
given, in the next subsection I will discuss who chooses it and how it is chosen.

The joint value of the match has two components. The first component is the present
value of output produced until separation. For a geometric Brownian motion, current
productivity provides all the information about how the process is likely to evolve in the
future. Thus the present value of output depends only on current productivity \( y \) and the
reservation productivity \( y \). Let \( Y(y, y) \) denote this present value. An increase in current
productivity increases the present value of output, both because it makes it more likely that
output is high at a given point in the future and because it takes longer on average to reach
the reservation productivity. A higher reservation productivity \( y \) implies earlier separation
and thereby a lower present value of output.

In addition to its output the firm-worker pair receives the joint outside opportunity
\( V \) upon separation. Let \( Z(y, y, V) \) be its present value. If current productivity increases
it will take longer until separation occurs, which reduces \( Z(y, y, V) \). An increase in the
reservation productivity has the opposite implication.

The total joint value of the match is then given by the sum \( Y(y, y) + Z(y, y, V) \). Now
consider a match with current productivity \( y > y \) (if \( y \leq y \) separation occurs immedi-
ately, so there is no question about how the value of the match is split). Wage setting determines
how the joint value of the match is divided between the firm and the worker. First I will
briefly review continuous time Nash bargaining. Then I consider a different mode of wage
setting in which separations are bilaterally inefficient. Finally I combine the two in order
to obtain the general specification of wage determination that I will use in this chapter.
Continuous Time Nash Bargaining. I assume that bargaining first takes place immediately after the firm has hired the worker. Thus the first bargain already takes into account that the outside opportunities of the firm and the worker are altered by firing costs.\(^{16}\) Bargaining occurs continuously until separation. Each of the two parties must at least receive its outside opportunity. What remains of the joint value of the match after each side has been allocated its outside opportunity is referred to as the surplus of the match. It is given by

\[
S(y, y, V) \equiv Y(y, y) + Z(y, y, V) - V.
\]

The effect of the joint outside opportunity \(V\) on the surplus will play a crucial role in shaping the preferences for employment protection. Its direct effect is to reduce the surplus one to one. However, upon separation the parties receive the joint outside opportunity, so the value of the match is increasing in \(V\). Yet this offsetting increase in \(Z(y, y, V)\) is less than one to one due to discounting since separation occurs at some point in the future. Therefore the net effect of an increase in \(V\) on the surplus is a less than one for one reduction. More formally, the partial derivative \(\frac{\partial S}{\partial V}(y, y, V)\) lies in the interval \((-1, 0)\). Furthermore, the offsetting increase in \(Z(y, y, V)\) is small for high productivity matches since for them separation is very remote, so that an increase in the joint outside opportunity has only little effect on the joint value of the match. As a consequence the fall in the surplus is larger for matches with high productivity. More formally, the cross derivative \(\frac{\partial^2 S}{\partial V \partial y}(y, y, V)\) is negative. This discussion is summarized in the following lemma. Let \(C_S = \{(y, y, V) \in \mathbb{R}_+^3 | y > y\}\) be the

\(^{16}\)If the first bargain coincides with hiring the worker, then continuous time Nash bargaining requires that the worker makes a payment to the firm at the time of hiring. Specifically, the worker will pay the severance payment plus a fraction of the wasteful firing cost that corresponds to his share in bargaining. This “bonding” payment would imply that as far as new matches are concerned, severance payments are neutralized as discussed in Lazear (1990). Additionally, wasteful firing cost would not benefit newly hired workers (even holding the utility of the unemployed constant). Nevertheless, the analysis of this chapter will still be valid as long as workers in existing matches experience an improvement in their bargaining position in response to an increase in firing costs. The only result that changes is that an increase in severance payments will no longer shift the productivity distribution toward lower values. Since severance payments are neutralized, they will not shift the distribution at all. Thus severance payments would have no effect on their own political support (in contrast to the negative effect in the absence of bonding).

Mortensen and Pissarides (1999b) analyze the economic effects of firing costs if such bonding takes place. In their model bonding does not take the form of a payment at the time of hiring. They deviate from continuous time Nash bargaining by assuming that the wage is only renegotiated in response to a productivity shock. As they assume a Poisson process for changes in productivity, the initial wage will remain in place for some time. This initial wage will be so low that in expectation the worker will make the same bonding payment as described above.
subset of the domain of $S$ on which the match continues to operate.

**Lemma 1** The surplus $S$ is twice continuously differentiable on $C_S$. For $(y, y, V) \in C_S$ one has $\frac{\partial S}{\partial y} (y, y, V) \in (-1, 0)$ and $\frac{\partial^2 S}{\partial y^2} (y, y, V) < 0$. For $(y, y, V) \not\in C_S$ the surplus $S(y, y, V)$ is zero.

**Proof.** See Appendix 1.6.2. ■

According to continuous time Nash bargaining the worker and the firm split the surplus with shares $\beta(\lambda)$ and $1 - \beta(\lambda)$ where the share $\beta(\lambda) \in [0, 1]$ is determined by labor market regulation $\lambda$. Thus the utility of the worker can be written as

$$W(y, y, V, U, \lambda) \equiv U + T(\lambda) + \beta(\lambda)S(y, y, V).$$

Writing utility conditional on $U$ and $V$ in this particular way will prove very useful later. However, at this point it is not very intuitive. To provide more intuition I will now compute the wage implied by this sharing rule. To obtain the wage, one merely has to rewrite this sharing rule in terms of flows. As current output is $y$ and the opportunity costs of the match are given by $rV$, the surplus flow is given by $y - rV$. The wage received by the worker is simply his own opportunity cost $r[U + T(\lambda)]$ plus a fraction $\beta(\lambda)$ of the flow surplus. To obtain the most intuitive expression of the wage, I will use the relationship $V = U + R(\lambda)$ to eliminate $V$:

$$w(y, U, \lambda) \equiv r[U + T(\lambda)] + \beta(\lambda)[y - r(U + R(\lambda))].$$

What is the partial equilibrium effect (holding constant the utility of the unemployed $U$) of labor market regulation on the wage? Severance payments raise the wage by improving the outside opportunity of the worker. Wasteful firing costs raise the wage by reducing the outside opportunity of the firm, which works through a reduction in the remaining scrapping value $R(\lambda)$. Finally labor market regulation enables workers to capture a larger share of the flow surplus. Notice that in all three cases labor market regulation improves the bargaining position of the worker and enables him to ask for a higher wage. According to the terminology used in the introduction, these three mechanisms are part of the appropriation effect of labor market regulation.
Bilaterally Inefficient Separations. I will introduce bilaterally inefficient separations in a simple ad hoc fashion by introducing a wedge \( q(y) \) between the wage and the opportunity costs of the worker:

\[
w(y, U, \lambda) = r[U + T(\lambda)] + q(y).
\]

I assume that the wedge \( q(y) \) is strictly positive for all productivity levels \( y > 0 \). Two additional assumptions are made to simplify the exposition and for technical reasons. First, I assume that \( y - q(y) \geq \varepsilon y \) where \( \varepsilon > 0 \), so at least some constant fraction of output is not consumed by the wedge. Second, I assume that \( q'(y) < 1 \), so that \( y - q(y) \) is strictly increasing.\(^{17} \) Apart from this the wedge is unrestricted. In particular, it need not be monotone in productivity.\(^{18} \) How does labor market regulation affect the wage in this case? As before there is an appropriation effect operating through severance payments. This is the only way in which regulation affects the wage. If firing costs are entirely wasted, then even this effect is absent. But this does not mean that the worker cannot gain from wasteful firing costs. To see this, notice that the utility of the worker is now given by

\[
W(y, U, \lambda) = U + T(\lambda) + Q(y, y)
\]

where \( Q(y, y) \) is the present value of the wedge \( q(y) \) received over the remaining duration of the job. This present value is strictly decreasing in the reservation productivity \( y \) as earlier separation shortens the time span over which the flow \( q(y) \) is received. More formally, the partial derivative \( \frac{\partial Q}{\partial y} (y, y) \) is strictly negative. Conversely, a reduction in the reservation productivity increases the present value of the wedge \( Q(y, y) \) and, everything else equal, increases the utility of the worker. But this increase in utility will be small if current productivity is high. On average it will take a high productivity match a long time to reach

\(^{17}\) As I will show in the next subsection, the firm will make the separation decision under these circumstances. The assumption that \( q'(y) < 1 \) insures that the optimal policy of the firm takes the form of a reservation productivity below which separation occurs. The assumption that \( y - q(y) \geq \varepsilon y \) simplifies the exposition by insuring that the reservation productivity chosen by the firm is finite.

\(^{18}\) It is tempting to interpret the wedge \( q(y) \) as an efficiency wage payment. However, there is a reason to be somewhat cautious concerning this interpretation. In particular, the size of the efficiency wage payment a firm desires to make could be directly affect by employment protection, so one would have to write \( q(y, \lambda) \). This would generate another channel through which employment protection can affect the wage. An examination of this channel is left to future work. A second interpretation is that \( q(y) \) is induced by other types of labor market regulation such as policies that strengthen collective bargaining. I will comment on this interpretation in the conclusion to this chapter.
the reservation productivity, so the gains from a reduction in the reservation productivity are very remote. More formally, the cross derivative \( \frac{\partial^2 Q}{\partial y \partial y} (y, y) \) is strictly positive. Let \( C_Q = \{ (y, y) \in \mathbb{R}^2_+ | y > y \} \) be the subset of the domain of \( Q \) on which the match continues to operate. The following lemma summarizes the preceding discussion.

**Lemma 2.** The present value of the wedge \( Q \) is twice continuously differentiable on \( C_Q \). For \( (y, y) \in C_Q \) one has \( \frac{\partial Q}{\partial y} (y, y) < 0 \) and \( \frac{\partial^2 Q}{\partial y \partial y} (y, y) > 0 \). For \( (y, y) \notin C_Q \) the present value \( Q (y, y) \) is zero.

**Proof.** See Appendix 1.6.2.

Given this specification of wages it is clear that the worker never wants to separate. As a consequence separation is always involuntary from the perspective of the worker. In the next subsection I will show that separations will also be bilaterally inefficient. But first I will introduce a more general specification of wage setting that nests both continuous time Nash bargaining and bilaterally inefficient separations.

**Nested Specification.** A simple way of nesting the two specifications of wage determination discussed above consists of two steps. First, I redefine the surplus as follows

\[
S (y, y, V) = Y (y, y) + Z (y, y, V) - V - \varphi Q (y, y) .
\]  

(1.1)

The redefined surplus is what remains of the joint value of the match after each party has been allocated its outside opportunity and in addition the worker has received the present value of the wedge \( \varphi Q (y, y) \). The parameter \( \varphi \) is either zero or one: if \( \varphi = 0 \) the general specification reduces to continuous time Nash bargaining; setting \( \varphi = 1 \) generates bilaterally inefficient separations. Subtracting \( \varphi Q (y, y) \) does not change how the joint outside opportunity \( V \) affects the surplus, so Lemma 1 still applies to the redefined surplus. Second, I assume that the worker receives his outside opportunity, the present value of the wedge, plus a fraction \( \beta (\lambda) \) of the redefined surplus:

\[
W (y, y, V, U, \lambda) = U + T (\lambda) + \varphi Q (y, y) + \beta (\lambda) S (y, y, V) .
\]  

(1.2)
To compute the wage implied by this specification, notice that the flow corresponding to the redefined surplus is given by \( y - \varphi q(y) - rV \). Thus the wage is given by

\[
w(y, U, \lambda) = r[U + T(\lambda)] + \varphi q(y) + \beta(\lambda)[y - \varphi q(y) - r(U + R(\lambda))],
\]

where again I used the relationship \( V = U + R(\lambda) \) to eliminate the joint outside opportunity \( V \).

### 1.1.3 Labor market regulation

As discussed above, labor market regulation enters the model in two places. First, through \( \gamma(\lambda) \) labor market regulation determines the size of the severance payment \( T(\lambda) \) and the remaining scrapping value \( R(\lambda) \). Second, labor market regulation determines the share \( \beta(\lambda) \) of the surplus that the worker is able to appropriate. Notice that so far I have been silent on what the domain of \( \lambda \) is. Now I will be more specific. In particular, I assume that \( \lambda \) varies in the unit interval \([0, 1]\). I am mainly interested in two cases. In the case of pure employment protection only the extent of employment protection varies while the extent of surplus appropriation is fixed: \( \beta(\lambda) = \tilde{\beta} \) for all \( \lambda \in [0, 1] \). The case of pure surplus appropriation is orthogonal: \( \gamma(\lambda) = \tilde{\gamma} \) for all \( \lambda \in [0, 1] \).

However, there is no reason not to adopt a slightly more general specification. In particular I will assume that \( \beta \) and \( \gamma \) are continuous weakly increasing functions of \( \lambda \):

\[
\beta : [0, 1] \rightarrow [0, 1] \quad \text{and} \quad \gamma : [0, 1] \rightarrow [0, 1].
\]

To avoid that some levels of \( \lambda \) are redundant, I assume that increasing \( \lambda \) increases the extent of at least one of the two types of labor market regulation: \( \lambda^H > \lambda^L \) implies \( \beta(\lambda^H) > \beta(\lambda^L) \) or \( \gamma(\lambda^H) > \gamma(\lambda^L) \) for all \( \lambda^H, \lambda^L \in [0, 1] \).

### 1.1.4 Separation Decision

Subtracting the utility of the worker given in equation (1.2) from the joint value of the match yields the value of the firm:

\[
J(y, y, V, \lambda) = R(\lambda) - T(\lambda) + (1 - \beta(\lambda))S(y, y, V).
\]

---

\(^{19}\)Notice that this specification keeps the policy space one-dimensional. For the political economy analysis this implies that I do not allow a choice between employment protection and surplus appropriation. Studying the politically optimal combination of these different types of labor market regulation is left to future work.
The outside opportunity of the firm is the remaining scrapping value \( R(\lambda) \) minus the severance payment \( T(\lambda) \). In addition the firm receives a share \((1 - \beta(\lambda))\) of the (redefined) surplus.

My discussion of the separation decision will proceed in three steps. First I will describe the separation decision under the assumption that it is the firm who makes this decision. Then I will show that under Nash bargaining \((\varphi = 0)\) the worker agrees with the decision of the firm, so separation is voluntary from the perspective of the worker. I will also show that separation is bilaterally efficient. Finally I will show that in the case \( \varphi = 1 \) the worker wants to separate later than the firm. This leads to separations that are bilaterally inefficient and involuntary from the perspective of the worker.

From equation (1.3) it is clear that the firm wants to maximize the surplus \( S(y, y, V) \). The following lemma describes the solution to this problem.

**Lemma 3** There is a unique reservation productivity \( y^*(V) \) that maximizes the surplus \( S(y, y, V) \) for all productivity levels \( y \geq 0 \). It satisfies the condition \( \frac{\partial S}{\partial y}(y, y^*(V), V) = 0 \) for all \( y \geq 0 \). The function \( y^*: \mathbb{R}_+ \to \mathbb{R}_+ \) has the following properties: \( y^*(0) = 0 \), \( \lim_{V \to \infty} y^*(V) = +\infty \) and \( y''(V) > 0 \). The maximized value \( S(y, y^*(V), V) \) is increasing in productivity \( y \).

**Proof.** See Appendix 1.6.2.

The properties established in this Lemma are quite intuitive. In particular, the firm prefers earlier separation if the joint outside opportunity is high. Moreover, it is good to be in a high productivity match: the maximized surplus is increasing in current productivity \( y \).

Now consider the case of Nash bargaining \((\varphi = 0)\). It follows from the definition of worker utility in equation (1.2) that in this case the worker also wants to maximize the surplus. Thus the worker and the firm agree on the timing of separation. Moreover, the value of the match can be written as \( V + S(y, y, V) \), so maximization of the surplus also leads to separations that are bilaterally efficient.

Next turn to the case \( \varphi > 0 \). Consider a match with current productivity exactly equal to the reservation productivity \( y^*(V) \) preferred by the firm. Then it is clear from equation (1.2) that the worker would benefit from a marginal reduction in the reservation productivity. This reduction would have no effect on the surplus because of the first order
condition satisfied by $y^* (V)$. However, it would increase the present value of the wedge $Q$. In other words, the reservation productivity preferred by the worker lies strictly below the reservation productivity preferred by the firm. Moreover, the value of a match is now given by $V + Q (y, y) + S (y, y, V)$. Thus the reservation productivity $y^* (V)$ is also too high from the perspective of bilateral efficiency.\footnote{The bilaterally efficient reservation productivity will lie somewhere between the reservation levels preferred by the firm and the worker, respectively.} As the firm wants to separate earlier, its preferred reservation productivity will be binding. Thus $y^* (V)$ will be the productivity level at which separation occurs both if $\varphi = 0$ and if $\varphi = 1$.

### 1.1.5 General Equilibrium Path

As discussed in subsection 1.1.1, the utility of the unemployed $U$ (and thereby the joint outside opportunity $V$) as well as the hiring rate $h$ are constant along the equilibrium path after the change in regulation at time $t = 0$. I will now state the conditions that determine these three constants in general equilibrium. It will be useful for this purpose to have a short notation for the surplus and the present value of the wedge for new matches, so define $\hat{S} (V) \equiv S(y_0, y^* (V), V)$ and $\hat{Q} (V) \equiv Q (y_0, y^* (V))$. With this notation the equilibrium conditions can be written as follows:

\begin{align}
0 & \leq h, \\
0 & \geq R (\lambda) - T (\lambda) + (1 - \beta (\lambda)) \hat{S} (V) - c (h), \\
0 & = h \left[ R (\lambda) - T (\lambda) + (1 - \beta (\lambda)) \hat{S} (V) - c (h) \right], \\
rU & = h \left[ T (\lambda) + \varphi \hat{Q} (V) + \beta (\lambda) \hat{S} (V) \right], \\
V & = U + R (\lambda).
\end{align}

Condition (1.4) simply states that the hiring rate cannot be negative. The two conditions (1.5) and (1.6) are concerned with the entry decision of firms. The value of a new firm is given by the sum of its outside opportunity $R (\lambda) - T (\lambda)$ and its share in the surplus $(1 - \beta (\lambda)) \hat{S} (V)$. Condition (1.5) states that in equilibrium the value of a new firm cannot exceed creation costs (since otherwise more firms would like to enter). According to condition (1.6) the value of a new firm may only fall short of creation costs in an equilibrium without entry.
Condition (1.7) is the asset equation associated with the utility of unemployed workers. The condition states that the return \( rU \) must equal the capital gain of finding a job. The latter is given by the product of the hiring rate and the utility gain from being hired. Finally, equation (1.8) restates the definition of the joint outside opportunity.

I will assume that \( y_0 \) is sufficiently large such that \( \hat{S}(X) > 0 \). (Recall that \( X \) is the scrapping value of a match.) If this condition fails, then the value of a new firm can never cover creation costs, and consequently there will never be any hiring along the equilibrium path of the economy, irrespective of the level of labor market regulation. The condition \( \hat{S}(X) > 0 \) rules out this uninteresting case.\(^{21}\)

In the following lemma I establish that an equilibrium always exists, is unique and varies continuously with the extent of labor market regulation \( \lambda \).

**Lemma 4** 1. For each level of labor market regulation \( \lambda \in [0, 1] \) the conditions (1.4)—(1.8) have a unique solution \( (U(\lambda), V(\lambda), h(\lambda)) \).

2. The functions \( U(\lambda), V(\lambda) \) and \( h(\lambda) \) are continuous on \([0, 1]\).

**Proof.** See Appendix 1.6.3.

Notice that the lemma is silent on how the functions \( U(\lambda), V(\lambda) \) and \( h(\lambda) \) vary with the extent of labor market regulation \( \lambda \). An answer to this question will not be needed for the political economy analysis below, so a formal analysis is omitted. However, a brief discussion is useful to provide a better understanding of how the model works.

First notice that there may exist a level of labor market regulation beyond which hiring ceases entirely, call it \( \lambda^P \) (and set it equal to one if no prohibitive regulation level exists). As hiring stops for \( \lambda \geq \lambda^P \), the utility of the unemployed \( U(\lambda) \) is zero and the joint outside opportunity is simply \( V(\lambda) = R(\lambda) \).

What is the behavior of \( U(\lambda), V(\lambda) \) and \( h(\lambda) \) for nonprohibitive levels of labor market regulation? One can show that the hiring rate is strictly decreasing in labor market regulation on the nonprohibitive range \([0, \lambda^P]\). It is easy to see why this must be the case. Suppose the hiring rate would increase in response to an increase in regulation \( \lambda \). For an unchanged utility of the unemployed, a firm now receives a smaller share of the surplus, its outside

\(^{21}\)If \( \hat{S}(X) = 0 \), then \( \hat{S}(R(\lambda)) \leq X - R(\lambda) \) since the surplus falls less than one to one with the joint outside opportunity. Thus the value of a new firm is less than \( X - T(\lambda) \), which does not cover creation costs if hiring is positive.
opportunity is reduced and it faces increased creation costs. To maintain the willingness of firms to enter, the utility of unemployed workers must fall. But due to the increase in both labor market regulation and the hiring rate, unemployed workers are in fact better off. Thus the hiring rate can never increase in response to an increase in labor market regulation.

One can also show that in the two cases of pure employment protection and pure surplus appropriation the joint outside opportunity $V(\lambda)$ is hump shaped on the nonprohibitve range $[0, \lambda^p]$ if a mild restriction on creation costs is satisfied.\textsuperscript{22} This means that at low levels of regulation both the joint outside opportunity $V(\lambda)$ and the utility of the unemployed $U(\lambda) = V(\lambda) - R(\lambda)$ can actually be increasing in regulation.\textsuperscript{23}

Although no precise knowledge of the functions $U(\lambda)$, $V(\lambda)$ and $h(\lambda)$ will be required, it will simplify the exposition to impose a mild assumption on the utility of unemployed workers. In particular I will assume that the utility of unemployed workers is minimized at the maximal level of regulation $\lambda = 1$. Notice that the existence of a prohibitive level of regulation is sufficient for this assumption to hold, since it implies $U(1) = 0$.

Using the function $W$ defined in equation (1.2), I am now in a position to express the utility of a worker at time $t = 0$ as a function of the productivity of his match and continuing labor market regulation:

$$W(y, \lambda) \equiv W(y, y^*(V(\lambda)), V(\lambda), U(\lambda), \lambda).$$

(1.9)

1.1.6 Steady State

In this subsection I will determine the steady state induced by a level of labor market regulation $\lambda_0$ in three steps. First I will compute the steady state distribution of productivity across employed workers. Then I derive the steady state destruction rate and finally I calculate steady state employment.

**Distribution of Productivity** In steady state a constant number of new matches $H$ is created at each point in time. Now consider such a cohort of new matches and follow it through time. All matches start with productivity $y_0$ but subsequently they are subject to

\textsuperscript{22}The restriction is $\frac{C''(\lambda)}{C'(\lambda)} > -2$. It requires that the marginal cost of creation does not decline too rapidly.

\textsuperscript{23}This result is related to the presence of congestion externalities in the Mortensen-Pissarides model and search models more generally.
idiosyncratic productivity shocks. If the productivity of a match falls below the constant reservation productivity $y$ it will separate. Thus the size of the cohort will shrink as time passes. Now revisit this cohort $a$ periods after it has been created, in other words consider a cohort of age $a$. Let $\Pi(y, a)$ be the fraction of matches that have not yet been destroyed, so $\Pi(y, a)H$ is the total number of matches that have survived for $a$ periods. Similarly let $\Pi(y, y, a)H$ be the total number of matches that is left after $a$ periods and exhibits current productivity below the level $y$.

In steady state there are cohorts of all ages, and the size of the cohort of age $a$ is given by $\Pi(y, a)H$. Summing over cohorts yields total employment $H \int_0^\infty \Pi(y, a)da$. Similarly one can obtain total employment in matches with productivity less than $y$ as $H \int_0^\infty \Pi(y, y, a)da$. Taking the ratio of these two quantities yields the fraction of total employment in matches with productivity below $y$:

$$
\Psi(y, y) = \frac{\int_0^\infty \Pi(y, y, a)da}{\int_0^\infty \Pi(y, a)da}.
$$

Considered as a function of $y$ this is a distribution function, and it gives the steady state distribution of productivity across employed workers. Notice that the cohort size $H$ has cancelled, so it is not actually needed to compute the steady state distribution of productivity. The reservation productivity $y$ is the only information that is required. In appendix 1.6.2 I compute the function $\Psi(y, y)$ in closed form. In the following lemma I establish that an increase in the reservation productivity shifts the productivity distribution toward larger values.

**Lemma 5** Consider $y^H > y^L$. Then $\Psi(y, y^H)$ strictly first order stochastically dominates $\Psi(y, y^L)$, that is

$$
\Psi(y, y^H) \leq \Psi(y, y^L)
$$

with strict inequality if both $\Psi(y, y^L) > 0$ and $\Psi(y, y^H) < 1$.

**Proof.** See Appendix 1.6.2.

This lemma is the last time I will make explicit use of the assumption that match-specific productivity follows a geometric Brownian motion. The theoretical results in this chapter will not rely on the geometric Brownian motion as such. Only the properties established in Lemmas 1–3 and 5 will be used to obtain these results.\(^{24}\)

\(^{24}\)This makes it straightforward to check whether the theoretical results of this chapter carry
Since $y^*(V(\lambda_0))$ is the steady state reservation productivity associated with the initial regulation level $\lambda_0$, the steady state productivity distribution as a function of initial regulation is given by

$$\Phi(y, \lambda_0) \equiv \Psi(y, y^*(V(\lambda_0))).$$

It follows from Lemma 5 that an increase in initial regulation shifts the productivity distribution toward lower values if and only if it depresses the joint outside opportunity $V(\lambda_0)$.

**Destruction Rate.** Let $L(\lambda_0)$ be steady state employment and let $d(\lambda_0)$ denote the steady state destruction rate. Together with the hiring rate $h(\lambda_0)$ they satisfy the relationship

$$d(\lambda_0)L(\lambda_0) = h(\lambda_0)(1 - L(\lambda_0)). \quad (1.11)$$

The left hand side is the outflow from employment. It is obtained by multiplying employment with the destruction rate. The right hand side is the flow into employment. Recall that the total mass of workers is normalized to one, so $(1 - L(\lambda_0))$ is steady state unemployment. The employment inflow is obtained by multiplying unemployment with the hiring rate.

The inflow into employment $H(\lambda_0) \equiv h(\lambda_0)(1 - L(\lambda_0))$ is also the initial size of a cohort of new matches. Then the size of a cohort of age $a$ is given by $\Pi(a, y^*(V(\lambda_0)))H(\lambda_0)$. Summing over cohorts yields steady state employment

$$L(\lambda_0) = h(\lambda_0)(1 - L(\lambda_0)) \int_0^\infty \Pi(a, y^*(V(\lambda_0)))da. \quad (1.12)$$

Taking the ratio of the two equations (1.11) and (1.12) and solving for the destruction rate yields

$$d(\lambda_0) = \left[ \int_0^\infty \Pi(a, y^*(V(\lambda_0)))da \right]^{-1}. \quad (1.13)$$

An increase in $V(\lambda_0)$ raises the reservation productivity and thereby reduces the survival fractions $\Pi(a, y^*(V(\lambda_0)))$. It follows that the destruction rate increases. Hence an increase over to other stochastic processes besides the geometric Brownian motion. One only needs to verify whether the properties stated in these lemmas hold for a specific stochastic process. The next level of generality would be to obtain these properties making only qualitative assumptions on the stochastic process of match productivity instead of checking them for specific processes. This is left to future work.
in $\lambda_0$ will reduce the destruction rate $d(\lambda_0)$ if and only if it depresses the joint outside opportunity $V(\lambda_0)$.

**Steady State Employment.** From equation (1.11) steady state employment is given by

$$L(\lambda_0) = \frac{h(\lambda_0)}{d(\lambda_0) + h(\lambda_0)}.$$  

Notice that if an increase in initial regulation depresses the joint outside opportunity $V(\lambda_0)$, then its impact on steady state employment is ambiguous: both the hiring rate and the destruction rate fall. This ambiguity is a common feature of many models of employment protection.$^{25}$

### 1.2 The Political Setup

In the previous section the model economy experienced an unanticipated exogenous change in the labor market regime at time $t = 0$. In the remainder of the chapter I assume that the new level of regulation $\lambda$ is the outcome of a political decision. Now it is the opportunity to change labor market regulation that arises unanticipated.$^{26}$ Recall that at time $t = 0$ the economy is assumed to be in the steady state induced by the initial level of labor market regulation $\lambda_0$. The goal is to determine how the political support for continuing labor market regulation $\lambda$ varies with the extent of initial regulation $\lambda_0$. Since employed workers are the principal beneficiaries of employment protection and surplus appropriation, I will primarily focus on the question how their support varies with the extent of initial regulation. I will do so by asking the hypothetical question: suppose the new level of regulation is determined in a majority vote among employed workers, how does the outcome vary with initial regulation. While the focus is on employed workers, I will examine how the results change if all workers including the unemployed participate in the vote. I will also provide an informal discussion of how initial regulation affects the political support for (or resistance against) employment protection coming from capitalists.

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$^{25}$Ljungqvist (2002) examines the effect of employment protection on the level of employment in a variety of general equilibrium models.

$^{26}$If the opportunity to change regulation is anticipated it would be be inconsistent to assume that the economy is in steady state at time $t = 0$. 

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1.2.1 Increasing Condorcet Winners

The political equilibrium concept under majority voting is that of a Condorcet winner. I will briefly review its definition. Let $\lambda_0$ be an initial level of labor market regulation. Consider two continuing levels of labor market regulation $\lambda, \lambda' \in [0, 1]$ and define the utility gain of a worker in a match with productivity $y$ if labor market regulation is changed from $\lambda$ to $\lambda'$:

$$\Delta(y, \lambda', \lambda) \equiv W(y, \lambda') - W(y, \lambda).$$

(1.14)

Let $\nu(\lambda' > \lambda; \lambda_0)$ be the mass of workers for which $\Delta(y, \lambda', \lambda) > 0$ under the distribution $\Phi(y, \lambda_0)$. In words, $\nu(\lambda' > \lambda; \lambda_0)$ is the fraction of employed workers that strictly prefer $\lambda'$ over $\lambda$. Then $\lambda'$ defeats $\lambda$ in a pairwise vote given initial regulation $\lambda_0$ if $\nu(\lambda' > \lambda; \lambda_0) > \nu(\lambda > \lambda'; \lambda_0)$. In words, $\lambda'$ defeats $\lambda$ if more workers strictly prefer $\lambda'$ over $\lambda$ than the other way around. A regulation level $\lambda \in [0, 1]$ is a Condorcet winner given initial regulation $\lambda_0$ if there does not exist a regulation level $\lambda' \in [0, 1]$ that defeats $\lambda$ in a pairwise vote.

In principal there could be several Condorcet winners or there could be none. The set of Condorcet winners given initial regulation $\lambda_0$ is denoted as $\mathcal{C}(\lambda_0)$.

I would like to be able to ask the following question: is the outcome of the political decision increasing or decreasing in initial regulation? To answer this question, I need to be able to order the sets $\mathcal{C}(\lambda_0)$. The order on sets I will use for this purpose is the strong set order. The set $\mathcal{C}(\lambda_0)$ is as high as the set $\mathcal{C}(\lambda_0')$, written $\mathcal{C}(\lambda_0) \succeq_S \mathcal{C}(\lambda_0')$, if for every $\lambda \in \mathcal{C}(\lambda_0)$ and $\lambda' \in \mathcal{C}(\lambda_0')$, $\lambda' > \lambda$ implies that both $\lambda$ and $\lambda'$ are elements of the intersection $\mathcal{C}(\lambda_0) \cap \mathcal{C}(\lambda_0')$. If the two sets are singletons consisting of $\lambda$ and $\lambda'$, respectively, then $\mathcal{C}(\lambda_0) \succeq_S \mathcal{C}(\lambda_0')$ corresponds to $\lambda \geq \lambda'$. Thus the strong set order can be regarded as an extension of the usual order from points to sets.\footnote{See Milgrom and Shannon (1994) for a detailed discussion of the strong set order.}

Using the concept of the strong set order, I can now define what I mean by saying that the political outcome is increasing or decreasing in initial regulation. Let $\Lambda_0 \subset [0, 1]$ be a set of initial regulation levels. Labor market regulation is said to exhibit increasing Condorcet winners on $\Lambda_0$ if for all $\lambda_0^H, \lambda_0^L \in \Lambda_0$ with $\lambda_0^H > \lambda_0^L$ the set $\mathcal{C}(\lambda_0^H)$ is as high as $\mathcal{C}(\lambda_0^L)$. Decreasing Condorcet winners are defined analogously by requiring that $\mathcal{C}(\lambda_0^L)$ is as high as $\mathcal{C}(\lambda_0^H)$.
1.2.2 Politically Relevant Levels of Labor Market Regulation

While the unit interval $[0,1]$ is the set of political choices, in this subsection I will show that one can restrict the search for Condorcet winners to the subset of regulation levels

$$\Lambda \equiv \{ \lambda \in [0,1] | \exists \lambda' \in [0,1] \text{ s.t. } \lambda' > \lambda \land U(\lambda') > U(\lambda) \} .$$

If a regulation level $\lambda$ is not in the set $\Lambda$, then there exists a larger regulation level $\lambda' \in [0,1]$ that is strictly preferred over $\lambda$ by unemployed workers. Furthermore, one can choose $\lambda'$ such that it is strictly preferred over $\lambda$ by almost all workers.\footnote{More precisely, for every $\epsilon > 0$ there exists $\lambda' > \lambda$ such that $\nu(\lambda' > \lambda; \lambda_0) > 1 - \epsilon$.} It follows that $\lambda$ cannot be a Condorcet winner since it is defeated in a pairwise vote by $\lambda'$.

**Lemma 6** The set of Condorcet winners $C(\lambda_0)$ is contained in the set of politically relevant alternatives $\Lambda$ for all $\lambda_0 \in [0,1]$.

**Proof.** See Appendix 1.6.4.

This lemma is still valid if unemployed workers vote, and it will still hold if capital is given some votes as long as capitalists are in the minority.

I will view initial regulations levels as the outcome of an earlier political decision, so I will require that they are elements of $\Lambda$. Thus the set of admissible initial regulation levels is given by $\Lambda_0 \equiv \Lambda$.

1.2.3 Regulation and the Distribution of Productivity

In subsection 1.1.6 I demonstrated that an increase in initial regulation shifts the productivity distribution $\Phi(y, \lambda_0)$ towards lower values if and only if it reduces the joint outside opportunity $V(\lambda_0)$. Now consider two regulation levels $\lambda_0^H, \lambda_0^L \in \Lambda_0$. By definition of the set $\Lambda_0$ it follows that $U(\lambda_0^H) \leq U(\lambda_0^L)$, which in turn implies $V(\lambda_0^H) \leq V(\lambda_0^L)$. If $V(\lambda_0^H) = V(\lambda_0^L)$ the distribution remains unchanged, otherwise Lemma 5 applies and the distribution shifts toward lower values in the sense of strict first order stochastic dominance. This proves the following lemma.

**Lemma 7** Consider $\lambda_0^H, \lambda_0^L \in \Lambda_0$ with $\lambda_0^H > \lambda_0^L$. Then either $\Phi(y, \lambda_0^L) = \Phi(y, \lambda_0^H)$ or $\Phi(y, \lambda_0^L)$ strictly first order stochastically dominates $\Phi(y, \lambda_0^H)$.
Thus as far as politically relevant alternatives are concerned, an increase in regulation will indeed shift the productivity distribution toward lower values. The intuition for this result is straightforward. A politically relevant increase in labor market regulation reduces the outside opportunities of matches and separation occurs at a lower level of productivity.

1.3 The Structure of Preferences for Labor Market Regulation

Is the shift in the productivity distribution toward lower values a shift toward supporters or opponents of labor market regulation? In this section I will analyze how the gains from labor market regulation vary with match-specific productivity.

As discussed in the introduction, there are two channels through which workers can benefit from an increase in labor market regulation. First, the appropriation channel captures the gains stemming from an improvement in the bargaining position of workers. Second, if separations are bilaterally inefficient, then workers can gain from job prolongation. However, employed workers face a trade-off as they will be affected by the adverse general equilibrium consequences of employment protection through the backlash effect. In subsection 1.3.1 I will decompose the utility gain from an increase in regulation into these three effects. In subsection 1.3.2 I will examine how each of the three components varies with match-specific productivity.

1.3.1 Decomposing the Gain from Higher Regulation

Consider two regulation levels $\lambda^H, \lambda^L \in \Lambda$ with $\lambda^H > \lambda^L$. Write $U^H = U(\lambda^H), V^H = V(\lambda^H)$ and so forth. By the definition of the set of politically relevant alternatives it follows that $U^H \leq U^L$ and thereby $V^H \leq V^L$. This in turn implies $y^H \leq y^L$ (where $y^H = y^*(V^H)$). Using equations (1.9) and (1.14) the utility gain from the increase in regulation can be written as

$$
\Delta(y, \lambda^H, \lambda^L) = W(y, y^H, V^H, U^H, \lambda^H) - W(y, y^L, V^L, U^L, \lambda^L).
$$
The first step is to separate out the direct effects of regulation and the utility of the unemployed:

\[
\Delta(y, \lambda^H, \lambda^L) = [W(y, y^L, V^L, U^L, \lambda^H) - W(y, y^L, V^L, U^L, \lambda^L) - [W(y, y^L, V^L, U^H, \lambda^H) - W(y, y^L, V^L, U^H, \lambda^L)]
\]

The first component captures the direct effect of the increase in regulation from \(\lambda^L\) and \(\lambda^H\). Using equation (1.2) it can be written as \([T^H - T^L] + [\beta^H - \beta^L]S(y, y^L, V^L)\). It consists of the increase in the severance payment and the increase in the share of the surplus the worker receives. This component will be part of the appropriation effect. The second component is the direct effect of the fall in the utility of the unemployed. It is simply given by \(U^H - U^L\) and will be part of the backlash effect.

The third component captures the effect of the reduction in both the joint outside opportunity and the reservation productivity. However, the drop in the reservation productivity is itself driven by the fall in the joint outside opportunity: \(y^H - y^L = y^*(V^H) - y^*(V^L)\). Thus the third component can be written as

\[
W(y, y^H, V^H, U^H, \lambda^H) - W(y, y^L, V^L, U^H, \lambda^H) = \int_{V^L}^{V^H} \frac{d}{dV} W(y, y^*(v), v, U^H, \lambda^H) \, dv.
\]

At this point I would like to extract the gain the worker experiences from job prolongation. Ideally the worker would like to be able to choose the reservation productivity directly. Here the only way to manipulate the reservation productivity is to change the joint outside opportunity through labor market regulation. However, changing the joint outside opportunity has a direct effect on utility as well. Yet the two effects are easily separated:

\[
\int_{V^L}^{V^H} \frac{d}{dV} W(y, y^*(v), v, U^H, \lambda^H) \, dv
\]

\[
= \int_{V^L}^{V^H} \frac{\partial}{\partial y} W(y, y^*(v), v, U^H, \lambda^H) y^*(v) \, dv + \int_{V^L}^{V^H} \frac{\partial}{\partial V} W(y, y^*(v), v, U^H, \lambda^H) \, dv. \quad (1.15)
\]

The first component captures the utility gain induced by longer job duration. This is the prolongation effect and it will be denoted \(\Delta_P(y, \lambda^H, \lambda^L)\).

In order to obtain the appropriation effect and the backlash effect, the second component
of equation (1.15) must be decomposed further. Notice that the joint outside opportunity changes for two distinct reasons:

\[ V^H - V^L = [R^H - R^L] + [U^H - U^L]. \]  

(1.16)

The first component is the partial equilibrium drop in the joint outside opportunity associated with an increase in wasteful firing costs. The second component is the general equilibrium fall in the utility of the unemployed.

The second component in equation (1.15) can be split into a general and a partial equilibrium part accordingly. Adding the partial equilibrium part to the direct effect of the increase in regulation yields the appropriation effect:

\[ \Delta_A(y, \lambda^H, \lambda^L) \equiv [T^H - T^L] + [\beta^H - \beta^L] S (y, y^L, V^L) \]

\[ + \int_{U^L + RH}^{U^L + RH} \frac{\partial}{\partial V} W (y, y^*(v), v, U^H, \lambda^H) dv. \]  

(1.17)

Adding the general equilibrium effect to the direct effect of the fall in the utility of the unemployed gives the backlash effect:

\[ \Delta_B(y, \lambda^H, \lambda^L) \equiv [U^H - U^L] + \int_{U^L + RH}^{U^H + RH} \frac{\partial}{\partial V} W (y, y^*(v), v, U^H, \lambda^H) dv. \]  

(1.18)

Notice that the decomposition of the fall in the outside opportunity in equation (1.16) can be used in the same way to split the prolongation effect into a partial and a general equilibrium component. Separation is delayed in partial equilibrium because an increase in wasteful firing costs makes splitting up less attractive. Separation is made even less attractive by the general equilibrium drop in the utility of the unemployed. The sum of the appropriation effect and the partial equilibrium component of the prolongation effect gives the total partial equilibrium effect of the increase in labor market regulation. In other words, the appropriation effect is simply the partial equilibrium effect purged of the utility gain achieved through job prolongation. Similarly the backlash effect is the general equilibrium effect purged of the gain due to prolongation.

In the remainder of this subsection I will use the properties established in Lemmas 1–3 to simplify the expressions for these three effects. Using equation (1.2), the prolongation
effect can be written as

\[ \Delta_P(y, \lambda^H, \lambda^L) = \varphi \int_{V_L}^{V_H} \frac{\partial}{\partial y} Q(y, y^*(v)) y''(v) dv + \beta^H \int_{V_L}^{V_H} \frac{\partial}{\partial y} S(y, y^*(v), v) y''(v) dv. \]

As discussed in subsection 1.1.4, the firm chooses the reservation productivity to maximize the surplus. The first order condition given in Lemma 3 implies that the second term of the prolongation effect is zero. Evaluating the integral for the first component, the prolongation effect can be written as

\[ \Delta_P(y, \lambda^H, \lambda^L) = \varphi \left[ Q(y, y^H) - Q(y, y^L) \right]. \] (1.19)

The prolongation effect captures the gain the worker receives from indirectly manipulating the reservation productivity through labor market regulation. Since the firm chooses the reservation productivity to maximize the surplus, the gain from manipulation the reservation productivity comes entirely from an increase in the present value of the wedge. Consequently if there is no wedge (\( \varphi = 0 \)), then there is no point in manipulating the reservation productivity.

The flip side of this observation is that the second component of the right hand side in equation (1.15) can be written as

\[ \int_{V_L}^{V_H} \frac{\partial}{\partial V} W(y, y^*(v), v, U^H, \lambda^H) dv = \beta^H \int_{V_L}^{V_H} \frac{\partial}{\partial V} S(y, y^*(v), v) dv \]

\[ = \beta^H \left[ S(y, y^H, V^H) - S(y, y^L, V^L) \right]. \] (1.20)

The first equality follows from equation (1.2). The second equality follows from another application of the first order condition in Lemma 3: as the change of the reservation productivity has no effect on the surplus, the entire increase in the surplus is due to the direct effect of the fall in the joint outside opportunity. I will use this result to simplify the expressions of both the appropriation and the backlash effect.

1.3.2 Match-Specific Productivity and the Gain from Regulation

In this subsection I will examine how each of the three effects - backlash, appropriation and prolongation – varies which match-specific productivity. I shall start with the backlash
effect since it is the most straightforward.

**Backlash Effect.** Using equation (1.20) (adapted for the change in the surplus from $U^L + R^H$ to $U^H + R^H$) to simplify equation (1.18), the backlash effect can be written as follows:

$$\Delta_B(y, \lambda^H, \lambda^L) = [U^H - U^L] + \beta^H [S(y, \bar{y}^H, V^H) - S(y, \bar{y}^{LH}, V^{LH})]$$

where $V^{LH} \equiv U^L + R^H$ and $y^{LH} \equiv y^*(V^{LH})$. A drop in the utility of unemployed workers reduces the utility of employed workers one to one through a fall in their outside opportunity. This is the first term of the backlash effect. However, this adverse effect is mitigated by an increase in the surplus. The fall in the utility of unemployed workers reduces the joint outside opportunity. As discussed in subsection 1.1.2, a drop in the joint outside opportunity reduces the value of the match since the parties receive the joint outside opportunity upon separation. However, this fall in the value of the match is less than one to one, so the surplus increases. Yet the increase in the surplus will only be small if productivity is low: as separation is very likely, the value of a low productivity match suffers relatively more if the joint outside opportunity deteriorates. As a consequence, the offsetting increase in the surplus is larger for high productivity matches. In other words, the backlash effect is increasing in productivity.

To develop some intuition for this result, it is useful to consider two extreme cases. First, suppose that workers do not participate in the surplus at all ($\beta^H = 0$). Then all workers are hit by the backlash effect in exactly the same way. Second, suppose workers receive the entire surplus ($\beta^H = 1$). Now a worker cares about the utility of unemployed workers only to the extent that he himself is at risk of becoming unemployed. The more insulated the worker is from unemployment, the less he is exposed to the adverse consequences of labor market regulation. In the first extreme case the backlash effect does not vary with productivity while in the second extreme case it is increasing. Clearly it will be increasing in the intermediate case as well: workers in high productivity matches care less about the utility of the unemployed because they are less exposed to unemployment.

The backlash effect is illustrated in panel (a) of figure 1-1. Naturally it is negative for everybody. For workers that will become unemployed despite higher regulation ($y \in [0, \bar{y}^H]$)
it is simply given by $U^H - U^L$. For workers in the interval $[y^H, y^{LH}]$ the backlash effect takes the from $U^H - U^L + S(y, V^H, y^H)$, which is clearly increasing in productivity. Finally consider workers that would remain employed even in the absence of the drop in the utility of the unemployed. A worker is a member of this group if his productivity lies in the interval $(y^{LH}, +\infty)$. The intuition for the increasing backlash effect over this range has already been discussed. To demonstrate this result formally, it is useful to once again express the change in the surplus as an integral:

$$
\Delta_B(y, \lambda^H, \lambda^L) = [U^H - U^L] + \beta^H \int_{V^{LH}}^{V^H} \frac{\partial}{\partial V} S(y, y^*(v), v) \, dv.
$$

Differentiating with respect to productivity yields

$$
\frac{\partial}{\partial y} \Delta_B(y, \lambda^H, \lambda^L) = \beta^H \int_{V^{LH}}^{V^H} \frac{\partial^2}{\partial V \partial y} S(y, y^*(v), v) \, dv.
$$

Recall from Lemma 1 that the cross derivative $\frac{\partial^2}{\partial V \partial y} S(y, v, y^*(v))$ is negative for $y > y^*(v)$. As $V^H \leq V^{LH}$ it follows that $\frac{\partial}{\partial y} \Delta_B(y, \lambda^H, \lambda^L) \geq 0$.

**Appropriation Effect.** Using equation (1.20) (adapted for the change in the surplus from $U^L + R^L$ to $U^L + R^H$) to simplify equation (1.17), the appropriation effect can be written as

$$
\Delta_A(y, \lambda^H, \lambda^L) = [T^H - T^L] + [\beta^H - \beta^L] S(y, y^L, V^L) + \beta^H \left[ S(y, y^{LH}, V^{LH}) - S(y, y^L, V^L) \right].
$$

This effect consists of three parts. The first part is the increase in the severance payment and does not vary with productivity. The second part is the additional fraction of the surplus the worker is able to appropriate, which increases in productivity along with the surplus.

The third part is the gain from an increase in wasteful firing costs. It is clear that

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20 These workers would become unemployed and have no surplus at all if the utility of the unemployed had not dropped from $U^L$ to $U^H$. It may be tempting to attribute the emergence of the surplus as a consequence of job prolongation. But this is incorrect. Manipulation of the reservation productivity alone would not have been able to generate a surplus in these matches.
Figure 1-1: Decomposition of Utility Difference $\Delta(y, \lambda^H, \lambda^L)$

(a) Backlash Effect $\Delta_B(y, \lambda^H, \lambda^L)$

(b) Appropriation Effect $\Delta_A(y, \lambda^H, \lambda^L)$

(c) Prolongation Effect $\Delta_P(y, \lambda^H, \lambda^L)$

(d) Utility Difference $\Delta(y, \lambda^H, \lambda^L)$
this gain must be increasing in productivity since formally it corresponds to the second part of the backlash effect, only the reason for the fall in the joint outside opportunity differs. Intuitively, an increase in wasteful firing costs improves the bargaining position of the worker by reducing the outside opportunity of the firm. The downside is that the waste is actually realized upon separation. For high productivity matches this is not a strong concern since separation is unlikely to occur in the near future. Thus the increase in the surplus will be larger for high productivity matches.

The appropriation effect is illustrated in panel (b) of figure 1-1. If productivity lies in the interval \([0, y^{LH}]\), then the worker will become unemployed despite the fall in the joint outside opportunity from \(V^L\) to \(V^{LH}\). Thus he only benefits from the increased severance payment. The appropriation effect for workers with productivity between \(y^{LH}\) and \(y^L\) is given by \([T^H - T^L] + \beta H S (y, y^{LH}, V^{LH})\). Matches in this range have no surplus under low regulation. However, a surplus emerges as a consequence of higher wasteful firing costs. Finally over the range \((y^L, +\infty)\) the appropriation effect is increasing both because of its second and its third part.

**Prolongation Effect.** Recall that the prolongation effect is given by:

\[
\Delta_P(y, \lambda^H, \lambda^L) = \varphi \left[ Q (y, \lambda^H) - Q (y, \lambda^L) \right].
\]

As mentioned before, the reservation productivity falls both for partial equilibrium and general equilibrium reasons. But the benefit the worker derives from prolongation is conceptually the same in both cases, so there is no need for a separate discussion.

The appropriation effect is illustrated in panel (c) of figure 1-1. In this case it is useful to begin the discussion with high productivity matches. If productivity is in the range \([y^L, +\infty)\), then the worker will remain employed under both low and high regulation. The increase in regulation extends the duration of the job and thereby the time over which the wedge \(q(y)\) is received. In particular, the interval \((y^H, y^L]\) is added to the range of productivity levels over which the worker keeps his job. If productivity is high, then it is unlikely that productivity will enter the interval \((y^H, y^L]\) in the near future, so the gain from job prolongation is small. Conversely, if productivity is close to the separation margin under low regulation, then the worker is likely to benefit from the increase in regulation very soon.
Thus workers in low productivity matches gain most from job prolongation, resulting in the downward sloping segment of the graph. To obtain this result formally, write

\[
\frac{\partial}{\partial y} \Delta_P(y, \lambda^H, \lambda^L) = \varphi \int_{y^L}^{y^H} \frac{\partial^2 Q}{\partial y \partial y} (y, y) dy.
\]

Recall from Lemma 2 that the cross derivative \( \frac{\partial^2 Q}{\partial y \partial y} (y, y) > 0 \) is positive if \( y > y^L \). As \( y^H \leq y^L \) it follows that \( \frac{\partial}{\partial y} \Delta_P(y, \lambda^H, \lambda^L) \leq 0 \).

Now consider the other end of the productivity spectrum. If productivity is below \( y^H \), then the worker will lose his job even under the high level of regulation. The drop in the reservation productivity is not large enough to allow this worker to experience an extension in job duration.

Finally suppose productivity is in the intermediate range \( (y^H, y^L) \). Now the worker would lose his job immediately under low regulation but remains employed under high regulation, so he does experience some extension in job duration. However, if productivity is close to \( y^H \), then the reprieve granted will be rather short and the gain from job prolongation is small. Over this interval the prolongation effect can be written as \( \varphi Q (y, y^H) \). In the figure it is drawn as increasing, but this need not be the case. However, since the effect is zero at \( y^H \) and continuous, it is clear that it must be increasing over the range \( (y^H, y^L) \) on average.

Thus one must qualify the statement that low productivity workers gain most from job prolongation: the prolongation effect is not monotone in productivity. The implications of this qualification will be discussed in detail in the next section.

### 1.4 The Ability of Labor Market Regulation to create its own Political Support

In subsection 1.2.3 I have shown that an increase in initial labor market regulation shifts the initial distribution of productivity toward lower values. The purpose of the previous section was to determine how match-specific productivity affects the gains from regulation. Now I will combine these results to analyze whether labor market regulation has the ability to create its own political support. Subsection 1.4.1 contains the main theoretical result.
of the chapter: under the standard assumption of continuous time Nash bargaining, labor market regulation has no such ability. To the contrary, the political support for regulation today is decreasing in the extent of past regulation.

In subsection 1.4.2 I discuss to what extent this negative result can be overturned if separations are bilaterally inefficient.

### 1.4.1 Continuous Time Nash Bargaining

In this subsection I set \( \varphi = 0 \), so the nested specification of wage determination reduces to continuous time Nash bargaining. From equation (1.19) it is clear that the prolongation effect is zero in this case. This is not to say that labor market regulation does not extend the duration of jobs. Yet workers do not benefit from job prolongation since separations are bilaterally efficient.

It follows that only the appropriation and the backlash effect are active. Since both are increasing in match-specific productivity, the utility difference \( \Delta(y, \lambda^H, \lambda^L) \) is increasing in productivity as well. Workers in matches with high productivity like labor market regulation best, both because they are in a better position to take advantage of an enhanced bargaining position and because they are more sheltered from unemployment. It follows that the political preferences \( W(y, \lambda) \) satisfy the single-crossing property of Gans and Smart (1996). This property guarantees the existence of a political equilibrium. In particular, any level of labor market regulation maximizing the utility of the employed worker with median productivity is a Condorcet winner. Hence the set of Condorcet winners \( C(\lambda_0) \) is not empty. How does it vary with initial regulation \( \lambda_0 \)?

An increase in initial regulation shifts the initial productivity distribution toward lower values and thereby toward workers that have little taste for regulation. This leads to the main theoretical result of this chapter: the political outcome is decreasing in initial regulation, so labor market regulation is unable to generate its own political support.

**Proposition 1** Suppose wages are determined through continuous time Nash bargaining \( (\varphi = 0) \). Then labor market regulation exhibits decreasing Condorcet winners on \( \Lambda_0 \).

**Proof.** See Appendix 1.6.5.

How is this result affected if unemployed workers participate in the vote? The answer
depends on how labor market regulation affects the level of employment. In particular, if initial employment \( L(\lambda_0) \) is decreasing in initial regulation \( \lambda_0 \), then political participation of unemployed workers strengthens the conclusion of Proposition 1. Unemployed workers suffer most from labor market regulation. Thus if high regulation in the past is associated with high unemployment, this provides an additional reason why the support for labor market regulation is low today.

Furthermore, in the case of pure employment protection it is easy to see that high initial regulation is associated with stronger resistance against continuing regulation by capitalists. Firms in low productivity matches suffer most from an increase in employment protection. Thus a shift of the productivity distribution toward lower values is a shift toward firms that will resist employment protection more heavily.\(^{30}\)

The case of continuous time Nash bargaining highlights that the presence of labor market rents \( \text{per se} \) does not make job prolongation valuable to workers, and does not enable employment protection to generate its own political support.

### 1.4.2 Bilaterally Inefficient Separations

In this subsection I allow separations to be bilaterally inefficient \( (\varphi = 1) \) and examine to what extent the negative result of the previous subsection can be overturned. Bilaterally inefficient separations activate the prolongation effect. I will focus on the case of pure employment protection, so regulation does not affect the share of workers in the surplus: \( \beta(\lambda) = \bar{\beta} \) for all \( \lambda \in [0, 1] \). Temporarily I will also assume that \( \bar{\beta} = 0 \), so the nested specification of wage determination reduces to the simple specification which I used to first introduce bilaterally inefficient separations in subsection 1.1.2. With \( \bar{\beta} = 0 \) the appropriation effect is still positive as long as employment protection partially takes the form of severance payments. However, now the appropriation effect is constant rather than increasing in productivity. Similarly, the backlash effect is still negative but constant rather than increasing. Thus setting \( \bar{\beta} = 0 \) eliminates the reasons why in the preceding subsection it was workers in high productivity matches who benefited most from employment protec-

\(^{30}\)Using equation (1.3), the value of firm can be written as \( J(y, \lambda) = R(\lambda) - T(\lambda) + (1 - \bar{\beta})S(y, g(V(\lambda)), V(\lambda)) \). I consider the case of pure employment protection, so \( \beta(\lambda) = \bar{\beta} \). An increase in employment protection reduces the outside opportunity of firms. This is partially offset by an increase in the surplus. However, as discussed in subsection 1.3.2, the increase in the surplus is relatively small for low productivity matches.
tion. This is the set of assumptions that is most favorable for overturning the negative result stated in Proposition 1. Panel (a) of figure 1-2 illustrates the shape of the utility difference $\Delta(y, \lambda^H, \lambda^L)$ under these assumptions. Notice that it is simply the prolongation effect $\Delta_P(y, \lambda^H, \lambda^L)$ shifted vertically by the net impact of the appropriation and backlash effect. If this net impact were positive, then all employed workers prefer the higher level of employment protection $\lambda^H$. Panel (a) shows the more interesting case in which the backlash effect outweighs the appropriation effect. Under continuous time Nash bargaining the utility difference was monotone increasing in productivity, implying the single-crossing property. The graph shows that bilaterally inefficient separations do not completely reverse this result. While the prolongation effect gives rise to a downward sloping segment of the utility difference, the single-crossing property fails to hold. Specifically, now there are two productivity levels at which workers are indifferent between the two levels of employment protection, denoted $\bar{y}$ and $\hat{y}$, respectively. How does the support for $\lambda^H$ vis-à-vis $\lambda^L$ depend on initial employment protection $\lambda_0$? Panel (a) also depicts the location of the initial productivity distribution $\Phi(y, \lambda_0)$, setting initial employment protection equal to the lower level $\lambda^L$ (vertically the distribution function is scaled to fill out the height of the graph). Starting from $\lambda_0 = \lambda^L$, a reduction in initial regulation shifts the productivity distribution toward larger values, which decreases the mass of workers that prefer the higher regulation level $\lambda^H$. Similarly, a small increase in initial employment protection will increase the number of workers that prefer $\lambda^H$. Up to now this is consistent with the ability of employment protection to generate its own political support. However, as $\lambda_0$ is increased further toward $\lambda^H$, eventually some mass of workers is shifted to the left of the lower indifference point $\hat{y}$. Now it is ambiguous whether a further increase in initial employment protection induces more support for $\lambda^H$.

It is instructive to look at this situation from a different angle that will reveal an asymmetry between proposals to make employment protection more stringent and proposals of deregulation. Panel (a) represents a situation in which employment protection is initially weak ($\lambda_0 = \lambda^L$) and there is a proposal to increase it to a higher level $\lambda^H$. This proposal splits employed workers in the middle: workers in low productivity matches are in favor, those in matches with high productivity oppose it. Panel (b) depicts a situation of initially strong employment protection ($\lambda_0 = \lambda^H$). However, now a proposal to reduce employment
Figure 1-2: Pure employment protection with $\beta = 0$

(a) Initial Regulation $\lambda_0 = \lambda^L$.

(b) Initial Regulation $\lambda_0 = \lambda^H$.

protection to a lower level $\lambda^L$ gathers support not only from workers in high productivity matches. Workers in matches with very low productivity have little to lose from deregulation since they are likely to be dismissed very soon even if employment protection remains stringent. To the contrary, they stand to gain a lot since deregulation will make it easier to find a new job once unemployment strikes. Thus deregulation will be supported by a coalition of workers both in matches with high and very low productivity.

According to this discussion one must qualify the statement that low productivity workers are the most ardent supporters of employment protection. In particular, there is no counterpart to Proposition 1: it is not necessarily true that Condorcet winners are everywhere increasing on the set of initial regulation levels $\lambda_0$.

What bilaterally inefficient separations generate is the theoretical possibility that Con-
dorcel winners are increasing in initial regulation. Figure 1-3 illustrates this possibility with a numerical example. I continue to focus on pure employment protection but I return to the nested wage setting specification by adopting a positive value of $\beta$. This allows me to contrast decreasing Condorcet winners under Nash bargaining with increasing Condorcet winners under bilaterally inefficient separations using a single configuration of parameters. Panel (a) depicts the case of bilaterally efficient separations ($\varphi = 0$). One can verify that the utility of unemployed workers is hump-shaped and maximized at a positive level of

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31The parameters used to generate figure 1-3 are $r = 0.1$, $c(h) = 4 + h^4$, $X = 3.6$, $y_0 = 1.5$, $\mu = -0.01$, $\sigma = 0$, $\delta = 0.01$, $\rho = 0.6$, and $\beta = 0.3$. The employment protection function is simply $\gamma(\lambda) = \lambda$ and the wedge is given by $q(y) = 0.2 \cdot y$. 

---
employment protection $\lambda^n$. Thus $\Lambda = [\lambda^n, 1]$ is the set of politically relevant regulation levels. The graph shows the unique Condorcet winner as a function of initial regulation. According to Proposition 1 this function must be decreasing. It intersects the 45-degree line at a level of regulation denoted $\lambda^s$. This level of employment protection is a stationary political equilibrium in the following sense: if it was in place before time $t = 0$, then it will be confirmed in the vote at time $t = 0$. Panel (b) considers the same parameter configuration with one exception: separations are now bilaterally inefficient ($\varphi = 1$). The utility of the unemployed is maximized at zero regulation and decreasing throughout, so the set of politically relevant alternatives is the entire unit interval $[0, 1]$. Condorcet winners are an increasing function of initial regulation until they reach the 45-degree line. Again there is a unique stationary political equilibrium $\lambda^s$. Yet for initial regulation levels larger than $\lambda^s$, no Condorcet winner exists.\(^\text{32}\)

Now suppose conditions are such that bilaterally inefficient separations do enable employment protection to create its own political support among employed workers. What happens if unemployed workers participate in the vote? If high initial regulation is associated with high initial unemployment, then political participation of unemployed workers reduces the ability of employment protection to generate its own support. Conversely, a positive effect of employment protection on the level of employment will enhance this ability.

From the perspective of capitalists nothing has changed. As the firm makes the separation decision there is no analog to the prolongation effect. It is still true that firms in low productivity matches suffer most from employment protection, so stringent protection in the past is associated with more resistance against employment protection today.

Thus if employment protection tends to increase unemployment, then stringent regulation in the past will give rise to a more polarized political conflict today: employed workers defend employment protection more urgently while a large number of unemployed workers and firms in low productivity matches favor deregulation.

\(^{32}\)The failure of the single-crossing property in the case of bilaterally inefficient separations also gives rise to the possibility of Condorcet cycles. This is what happens to the right of $\lambda^s$. To obtain a graph which is not truncated in this way, one could consider probabilistic instead of majority voting.

Of course it is no accident that Condorcet winners cease to exist immediately to the right of the stationary equilibrium $\lambda^s$. This is precisely the point at which the issue illustrated in panel (b) of figure 1-2 becomes relevant: now a marginal reduction in employment protection will also be supported by a group of workers in matches with very low productivity.

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1.5 Concluding Remarks

In this chapter I have examined the ability of employment protection to create its own political support. I have argued that the answer depends crucially on the features of wage setting. In particular, I have shown that employment protection has no such ability in the standard Mortensen-Pissarides model with continuous time Nash bargaining. While previous research has found employment protection to have this ability if it benefits workers through longer job duration, I have shown that not rents per se but bilaterally inefficient separations make job duration valuable and thereby enable employment protection to create its own support. On one hand my results indicate that the circumstances under which employment protection can generate its own political support are much more narrow than suggested by the previous literature. On the other hand, by identifying these circumstances more precisely I provide a more solid foundation for future research. Finally, building on the work of Mortensen and Pissarides I have developed a theoretical framework that should prove useful in carrying out this research. I will conclude by outlining two potentially fruitful avenues of future research for which my theoretical framework is well suited.

The first avenue is to allow agents to respond in a richer fashion to the extent of employment protection. This could generate mechanisms that strengthen the ability of employment protection to generate its own political support. The basic idea is simple: the presence of a policy induces agents to take actions in order to benefit from this policy. Once they have taken these actions, they are more likely to support the policy in the future. For example, stringent employment protection could encourage workers to undertake firm specific investments. Once workers have made such investments, they are more willing to support employment protection in the future in order to insure that they will reap the returns. The applicability of such mechanisms will once again depend on wage setting: it determines how the rents generated by specific investments are shared between the firm and the worker.

Allowing a richer response of agents can modify the effect of employment protection on its own political support in other interesting ways. Specifically, consider the response of capital. The experience of many European countries suggests that capital will respond to more stringent employment protection through withdrawal from the employment relationship: over time firms will develop technologies that rely less on the use of labor.\textsuperscript{33} This need not

\textsuperscript{33}See Caballero and Hammour (1998).
diminish the political support for employment protection among employed workers. On the other hand, it makes it more likely that employment protection has adverse consequences for employment. Taking into account this response of capital, high employment protection is more likely to induce a polarization in the political conflict between labor market insiders and outsider.

A second avenue of future research starts with the realization that the extent to which separations are bilaterally inefficient is itself influenced by policies. Minimum wages and the wage compression associated with collective bargaining and strong unions reduce the ability of firms and workers to make bilaterally efficient separation decisions. Furthermore, there are reasons to believe that these types of policies and employment protection are complementary. In the absence of employment protection a firm could circumvent wage compression by dismissing workers whose productivity falls short of the wage it would be required to pay. In the absence of policies on wages, firms could circumvent employment protection by reducing wages in order to induce quits.\textsuperscript{34} According to this argument, policies supporting wage compression and employment protection should be regarded as two sides of the same coin. The theoretical framework developed in this chapter should be well equipped to analyze the structure of political support for this combination of policies, and more specifically, whether it has the ability to generate its own support.

\textsuperscript{34}This argument is made informally in Bertola and Rogerson (1997).
1.6 Appendix

1.6.1 Idiosyncratic Uncertainty

Let $y(t, s, j)$ be the productivity at time $t$ of a match $j$ created at time $s$. It is assumed to follow a mixed jump-diffusion process. The diffusion component is a geometric Brownian motion while the jump component consists of a drop in productivity to zero with probability $\delta$ per unit of time. The stochastic differential associated with this process is

$$dy(t, s, j) = \mu y(t, s, j)dt + \sigma y(t, s, j)dz(t, s, j) + y(t, s, j) dq(t, s, j).$$

Here $z(t, s, j)$ is a Wiener process. The parameters $\mu \in \mathbb{R}_+$ and $\sigma \in \mathbb{R}_+$ capture drift and volatility, respectively. Finally $q(t, s, j)$ is a Poisson process with stochastic differential

$$dq(t, s, j) = \begin{cases} 0 & \text{with probability } 1 - \delta dt, \\ -1 & \text{with probability } \delta dt. \end{cases} \quad (1.21)$$

A technical assumption is needed to ensure that a stationary distribution of productivity exists. It is sufficient to assume that $\delta > 0$. However, if $\delta = 0$ the drift cannot be too large, in particular it must satisfy the condition $\eta \equiv \sigma^2 - \mu > 0$.

With $\delta = 0$ this process reduces to a geometric Brownian motion. With $\sigma = 0$ (which in turn requires $\mu < 0$) and $\delta > 0$ it reduces to the stochastic process considered in Saint-Paul (2002b).

1.6.2 Proofs of Lemmas 1, 2, 3 and 5

**Lemma 1** The surplus $S$ is twice continuously differentiable on $C_S$. For $(y, y, V) \in C_S$ one has $\frac{\partial S}{\partial V} (y, y, V) \in (-1, 0)$ and $\frac{\partial^2 S}{\partial V^2} (y, y, V) < 0$. For $(y, y, V) \notin C_S$ the surplus $S (y, y, V)$ is zero.

**Proof.** Consider a flow function $g(y)$. Productivity follows a geometric Brownian motion with lower barrier $y \geq 0$. Let $G(y, y)$ be the present value of this flow plus the present value of a termination payoff $\bar{G}$ received upon hitting (or dropping below) the barrier. Then
\( G(y, y) \) satisfies the differential equation (see Dixit (1993), pp. 19–20)

\[
(r + \delta)G(y, y) = g(y) + \delta \tilde{G} + \mu y \frac{\partial G}{\partial y}(y, y) + \frac{1}{2} \sigma^2 y^2 \frac{\partial^2 G}{\partial y^2}(y, y). \tag{1.22}
\]

Here the discount rate is given by \( r + \delta \) which reflects the fact that productivity drops to zero with Poisson arrival rate \( \delta \). Let \( G_0(y) \) be the present value of the flow \( g(y) \) in the absence of a lower barrier. Then the present value \( G(y, y) \) can be written as (see Dixit pp. 13–14 and p. 25)

\[
G(y, y) = G_0(y) + \frac{\delta}{r + \delta} \tilde{G} + \left[ \frac{r}{r + \delta} \tilde{G} - G_0(y) \right] \left( \frac{y}{y} \right)^\xi \tag{1.23}
\]

where \( \xi > 0 \) satisfies the quadratic equation \((r + \delta) + \mu \xi - \frac{1}{2} \sigma^2 \xi(1 + \xi) = 0\), that is

\[
\xi = \begin{cases} 
\frac{(\mu - \frac{1}{2} \sigma^2) + \sqrt{(\mu - \frac{1}{2} \sigma^2)^2 + 2(r + \delta) \sigma^2}}{\sigma^2} & \text{for } \sigma > 0, \\
\frac{-r + \delta}{\mu} & \text{for } \sigma = 0.
\end{cases}
\]

First I will use these formulas to compute the present value of the joint outside opportunity received at the time of separation, that is \( Z(y, y, V) \). The flow is zero and the termination payoff is \( V \), so

\[
Z(y, y, V) = \left[ \frac{\delta}{r + \delta} + \frac{r}{r + \delta} \left( \frac{y}{y} \right)^\xi \right] V.
\]

Then the surplus can be written as

\[
S(y, y, V) = Y(y, y) - \varphi Q(y, y) - \frac{r}{r + \delta} \left[ 1 - \left( \frac{y}{y} \right)^\xi \right] V. \tag{1.24}
\]

It follows immediately from this formula that for \((y, y, V) \in C_S\) both \( \frac{\partial S}{\partial V}(y, y, V) \in (-1, 0) \) and \( \frac{\partial^2 S}{\partial V^2}(y, y, V) < 0 \).

\begin{lemma}

The present value of the wedge \( Q \) is twice continuously differentiable on \( C_Q \). For \((y, y) \in C_Q\) one has \( \frac{\partial Q}{\partial y}(y, y) < 0 \) and \( \frac{\partial^2 Q}{\partial y^2}(y, y) > 0 \). For \((y, y) \notin C_Q\) the present value \( Q(y, y) \) is zero.

\end{lemma}
Proof. Using equation (1.23) the present value \( Q(y, y) \) can be written as

\[
Q(y, y) = Q_0(y) - Q_0(y) \left( \frac{y}{y} \right)^\xi.
\]  

(1.25)

It is intuitively clear that for \((y, y) \in C_Q\) it must be the case that \( \frac{\partial Q}{\partial y} (y, y) < 0\): earlier termination shortens the time span over which the flow \( q(y) \) is received. The proof of this result is omitted. Using this result it follows that for \((y, y) \in C_Q\)

\[
\frac{\partial^2 Q}{\partial y \partial y} (y, y) = -\frac{\xi \partial Q}{y \partial y} (y, y) > 0.
\]

\[\blacksquare\]

Lemma 3 There is a unique reservation productivity \( y^*(V) \) that maximizes the surplus \( S(y, y, V) \) for all productivity levels \( y \geq 0 \). It satisfies the condition \( \frac{\partial S}{\partial y} (y, y^*(V), V) = 0 \) for all \( y \geq 0 \). The function \( y^* : \mathbb{R}_+ \rightarrow \mathbb{R}_+ \) has the following properties: \( y^*(0) = 0 \), \( \lim_{V \rightarrow \infty} y^*(V) = +\infty \) and \( y^*(V) > 0 \). The maximized value \( S(y, y^*(V), V) \) is increasing in productivity \( y \).

Proof. Using formula (1.23) and the fact that the surplus is zero at the point of termination yields

\[
S(y, y, V) = \begin{cases} 
S_0(y, V) - S_0(y, y) \left( \frac{y}{y} \right)^\xi & \text{for } y \geq y, \\
0 & \text{for } y \leq y.
\end{cases}
\]  

(1.26)

Recall that \( S_0(y, V) \) is the present value of the flow \( s(y) \equiv y - \varphi q(y) - \tau V \). It is useful to define the flow \( s(y) \equiv \varepsilon y - \tau V \). The assumption that \( y - q(y) \geq \varepsilon y \) for some \( \varepsilon > 0 \) insures that \( s(y) \geq s(y) \) for all \( y \geq 0 \). Let \( S_0(y, V) \) be the present value of this flow. It is readily obtained in closed form:

\[
S_0(y, V) = \frac{y}{\tau + \delta} - \frac{\tau}{\tau + \delta} V.
\]

As \( S_0(y, V) \geq S_0(y, V) \) and \( \varepsilon > 0 \) it follows that \( \lim_{y \rightarrow +\infty} S_0(y, V) = +\infty \). As a final preliminary result, notice that \( S_0(0, V) = -\frac{\tau}{\tau + \delta} V \) since productivity never recovers once it has dropped to zero.

With these preparations I can now prove the lemma. First consider the case \( V = 0 \). Now \( S_0(0, V) = 0 \) and for \( y > 0 \) the present value \( S_0(y, V) \) is strictly positive. It follows
from inspection of equation (1.26) that \( y(V) = 0 \) maximizes \( S(y, y; V) \) for all \( y \geq 0 \).

Next consider the case \( V > 0 \). Define the function \( f(y) = S_0(y, V)y^\xi \). Notice that \( f(0) = 0 \). Moreover, the fact that \( \lim_{y \to +\infty} S_0(y, V) = +\infty \) implies that \( \lim_{y \to +\infty} f(y) = +\infty \) as well. Finally, since \( S_0(0, V) = -\frac{\tau r}{r + \delta} V < 0 \), it follows from continuity that there exists \( y > 0 \) such that \( f(y) < 0 \). Together these facts imply that the function \( f \) has a global minimizer on the interval \([0, +\infty) \) and that this global minimizer must be a local minimizer in the interval \((0, +\infty) \). Differentiation yields

\[
f'(y) = \frac{\partial S_0}{\partial y}(y, V)y^\xi + S_0(y, V)\xi y^{\xi - 1}.
\]

Using equation (1.22), the second derivative can be written as

\[
f''(y) = \frac{2}{\sigma^2} \left[ (\xi \sigma^2 - \mu) \frac{f'(y)}{y} - s(y)y^{\xi - 2} \right].
\]

Now suppose \( y^* \) is a local minimizer of \( f \) on \((0, +\infty) \) (as discussed above, there must be at least one). Then \( f'(y^*) = 0 \) and consequently \( f''(y^*) = -\frac{2}{\sigma^2} s(y^*)(y^*)^{\xi - 2} \). As \( y^* \) is a local minimizer it must be the case that \( s(y^*) \leq 0 \). It cannot be the case \( s(y^*) = 0 \) since this would imply \( f''(y) = -\frac{2}{\sigma^2} s(y^*) < 0 \) and \( y^* \) would be a saddle point rather than a minimizer. Thus \( s(y^*) < 0 \). Now consider \( y < y^* \). I will show that \( f'(y) < 0 \). Suppose to the contrary that \( f'(y) \geq 0 \). As \( f' \) crosses zero from below at \( y^* \), this implies that \( f' \) must cross zero from above at some point \( \tilde{y} \in [y, y^*) \), which implies \( f'('\tilde{y}) = 0 \) and \( f''('\tilde{y}) = -\frac{2}{\sigma^2} s('\tilde{y})('\tilde{y})^{\xi - 2} \geq 0 \). This in turn requires \( s('\tilde{y}) \geq 0 \), which contradicts the fact that \( s \) is strictly increasing since \( s < y^* \) and \( s(y^*) < 0 \). Next consider \( y > y^* \). I will show that \( f'(y) \geq 0 \). Suppose to the contrary that \( f'(y) < 0 \). Since \( f' \) crosses zero from below at \( y^* \), it must cross zero from above at some point \( \hat{y} \in (y^*, y) \). Furthermore, as \( \lim_{y \to +\infty} f(y) = +\infty \) the derivative \( f' \) must return to positive values, so it has to cross zero from below at some point \( \hat{y} > y \). This implies \( s('\hat{y}) \geq 0 \) and \( s('\hat{y}) \leq 0 \), once again a contradiction of the fact that \( s \) is strictly increasing. Finally notice that there can be at most one \( y > y^* \) such that \( f'(y) = 0 \), namely the productivity level that satisfies \( s(y) = 0 \). Together these facts imply that the function \( f(y) \) is strictly decreasing on \([0, y^*) \), strictly increasing on \([y^*, +\infty) \) and has a unique global minimum at \( y^*(V) \equiv y^* \).
Now I will use this result to show that \( y^*(V) \) maximizes \( S(y, y, V) \) for all \( y \geq 0 \). First, consider the case \( y > y^*(V) \). Then \( S(y, y^*(V), V) = y^{-\xi}[f(y) - f(y^*(V))] > 0 \), so it is not optimal to set \( y \) above \( y^* \). Thus a maximizer must lie in the interval \([0, y]\), which implies that it must minimize \( f \) on \([0, y]\), and the unique solution to this problem is \( y^*(V) \). Second, consider the case \( y \leq y^*(V) \). Then for \( y < y \) one has \( S(y, y, V) = y^{-\xi}[f(y) - f(y)] < 0 \), so it is optimal to set \( y \) above \( y \). One such optimal choice is given by \( y^*(V) \).

The function \( y^*(V) \) satisfies the first order condition \( \frac{\partial S}{\partial y}(y, y^*(V), V) = 0 \) for all \( y \geq 0 \). For \( y > y^*(V) \) it also satisfies the second order condition \( \frac{\partial^2 S}{\partial y^2}(y, y^*(V), V) < 0 \). Furthermore, equation (1.24) implies that \( \frac{\partial^2 S}{\partial y^2}(y, y^*(V), V) > 0 \). Thus implicit differentiation of the first order condition yields \( y^{**}(V) > 0 \).

It is intuitively clear that \( S(y, y^*(V), V) \) is increasing in productivity: higher initial productivity can only increase the maximized value of the surplus. The proof of this result is omitted.

\[ \textbf{Lemma 5} \] Consider \( y^H > y^L \). Then \( \Psi(y, y^H) \) strictly first order stochastically dominates \( \Psi(y, y^L) \), that is

\[ \Psi(y, y^H) \leq \Psi(y, y^L) \]

with strict inequality if both \( \Psi(y, y^L) > 0 \) and \( \Psi(y, y^H) < 1 \).

\[ \textbf{Proof.} \] I will compute the distribution function \( \Psi(y, y) \) in closed form. Let \( z_0 \equiv \log(y_0) \). Let \( z \) be a Brownian motion with \( z(0) = z_0 \) and stochastic differential

\[ dz = -\eta dt + \sigma dw \]

where \( w \) is a Wiener process and \( \eta \equiv \frac{1}{2}\sigma^2 - \mu \). Let \( z \equiv \log(y) \) and define \( T_z(z) \) to be the first time that \( z(t) \) hits \( z \). Let \( q \) be a Poisson process with stochastic differential

\[ dq = \begin{cases} 
0 & \text{with probability } 1 - \delta dt, \\
-1 & \text{with probability } \delta dt.
\end{cases} \quad (1.27) \]
and let $T_q$ be the first time the event of a jump occurs. Then

$$
\Pi(y, y, a) = P(T_q > a \land T_z(z) > a \land z(a) \leq \log(y))
$$

$$
= P(T_q > a) \cdot P(T_z(z) > a \land z(a) \leq \log(y))
$$

$$
= e^{-\delta_a} \left[ \Pi(z_0, a, z, z) - \Pi(z_0, a, z, \log(y)) \right]
$$

where

$$
\Pi(z_0, a, z, z) \equiv P(T_z(z) \land z(a) > z)
$$

is the probability that after $a$ periods the Brownian motion $z$ has not yet hit $z$ and currently exceeds $z$. Notice that $\Pi(z_0, a, z, +\infty) = 0$, so substituting into equation (1.10) yields $\Psi(y, y) = \tilde{\Psi}(\log(y), \log(y))$ where

$$
\tilde{\Psi}(z, z) \equiv \int_0^\infty e^{-\delta_a} \Pi(z_0, a, z, z) da - \int_0^\infty e^{-\delta_a} \Pi(z_0, a, z, z) da
$$

$$
= 1 - \frac{\Gamma(z_0, \delta, z, z)}{\Gamma(z_0, \delta, z, z)}
$$

and

$$
\Gamma(z_0, \delta, z, z) \equiv \int_0^\infty e^{-\delta_a} \Pi(z_0, a, z, z) da
$$

is the Laplace transform of $\Pi(z_0, a, z, z)$ when the latter is considered as a function of $a$. The next step of the proof is to compute the Laplace transform. Start with the backward equation satisfied by $\Pi(z_0, a, z, z)$:

$$
\frac{1}{2} \sigma^2 \frac{\partial^2}{\partial z_0^2} \Pi(z_0, a, z, z) - \eta \frac{\partial}{\partial z_0} \Pi(z_0, a, z, z) = \frac{\partial}{\partial a} \Pi(z_0, a, z, z).
$$

Transforming this equation yields the ordinary differential equation

$$
\frac{1}{2} \sigma^2 \frac{\partial^2}{\partial z_0^2} \Gamma(z_0, \delta, z, z) - \eta \frac{\partial}{\partial z_0} \Gamma(z_0, \delta, z, z) = \delta \Gamma(z_0, \delta, z, z) - \Pi(z_0, 0, z, z).
$$

At $a = 0$ all mass is concentrated at $z_0$, so

$$
\Pi(z_0, 0, z, z) = \begin{cases} 
0 & \text{for } z_0 \leq z, \\
1 & \text{for } z_0 > z.
\end{cases}
$$

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Two boundary conditions are needed. Notice that \( \tilde{\Pi}(\frac{z}{\sigma}, a, \frac{z}{\sigma}, z) = 0 \) because absorption occurs immediately if \( z_0 = \frac{z}{\sigma} \). This yields the first boundary condition \( \Gamma(z_0, \delta, \frac{z}{\sigma}, z) = 0 \). The second boundary condition uses the fact that \( \lim_{z_0 \to \infty} \tilde{\Pi}(z_0, a, \frac{z}{\sigma}, z) = 1 \) which implies \( \lim_{z_0 \to \infty} \Gamma(z_0, \delta, \frac{z}{\sigma}, z) = \frac{1}{\delta} \).

First consider the case \( \sigma > 0 \). Define

\[
\xi_1(\delta) = \frac{\eta}{\sigma^2} + \frac{\delta}{\sigma^2},
\]

\[
\xi_2(\delta) = -\frac{\eta}{\sigma^2} + \frac{\delta}{\sigma^2}.
\]

Then the solution of (1.29) subject to the two boundary conditions is given by

\[
\Gamma(z_0, \delta, \frac{z}{\sigma}, z) = \begin{cases} 
\xi_2(\delta)e^{\xi_1(\delta)(\frac{z}{\sigma} - z)} e^{\xi_1(\delta)(z_0 - z)} - e^{-\xi_2(\delta)(z_0 - z)} \xi_1(\delta) + \xi_2(\delta) 
+ \frac{1}{\delta} \left[ 1 - \xi_2(\delta) e^{\xi_1(\delta)(z_0 - z)} + \xi_1(\delta) e^{-\xi_2(\delta)(z_0 - z)} \right] & \text{for } z_0 \leq z,
\end{cases}
\]

\[
\Gamma(z_0, \delta, \frac{z}{\sigma}, z) = \begin{cases} 
\frac{\sigma^2}{2 \eta^2} \left[ e^{-\frac{2\eta}{\sigma^2}(z - z_0)} - e^{-\frac{2\eta}{\sigma^2}(z_0 - z)} \right] & \text{for } z_0 \leq z,
\frac{\sigma^2}{2 \eta^2} \left[ 1 - e^{-\frac{2\eta}{\sigma^2}(z - z_0)} - e^{-\frac{2\eta}{\sigma^2}(z_0 - z)} \right] & \text{for } z_0 \geq z.
\end{cases}
\]

This formula is valid for \( \delta > 0 \). Taking the limit as \( \delta \to 0 \) (using L'Hospital's rule in various places) yields

\[
\Gamma(z_0, 0, \frac{z}{\sigma}, z) = \frac{\sigma^2}{2 \eta^2} \left[ e^{-\frac{2\eta}{\sigma^2}(z - z_0)} - e^{-\frac{2\eta}{\sigma^2}(z_0 - z)} \right] & \text{for } z_0 \leq z,
\frac{\sigma^2}{2 \eta^2} \left[ 1 - e^{-\frac{2\eta}{\sigma^2}(z - z_0)} - e^{-\frac{2\eta}{\sigma^2}(z_0 - z)} \right] & \text{for } z_0 \geq z.
\]

Notice that \( \Gamma(z_0, \delta, \frac{z}{\sigma}, z) = \frac{1 - e^{-\xi_2(\delta)(z_0 - z)}}{\delta} \) for \( \delta > 0 \) and \( \Gamma(z_0, \delta, \frac{z}{\sigma}, z) = \frac{z - z_0}{\eta} \) for \( \delta = 0 \).

Substituting into equation (1.28) yields

\[
\tilde{\Psi}(z, z_0) = \begin{cases} 
1 - \frac{\xi_2(\delta)}{1 - e^{-\xi_2(\delta)(z_0 - z)}} e^{\xi_1(\delta)(z_0 - z)} e^{\xi_1(\delta)(z_0 - z)} - e^{-\xi_2(\delta)(z_0 - z)} \xi_1(\delta) + \xi_2(\delta) 
+ \frac{1}{\delta} \left[ 1 - \xi_2(\delta) e^{\xi_1(\delta)(z_0 - z)} + \xi_1(\delta) e^{-\xi_2(\delta)(z_0 - z)} \right] & \text{for } z \leq z_0 \leq 0,
\end{cases}
\]

\[
\tilde{\Psi}(z, z_0) = \begin{cases} 
\frac{\sigma^2}{2 \eta^2} \left[ e^{-\frac{2\eta}{\sigma^2}(z - z_0)} - 1 + e^{-\frac{2\eta}{\sigma^2}(z - z_0)} \right] & \text{for } z \leq z_0 \leq 0,
\frac{\sigma^2}{2 \eta^2} \left[ 2 \eta (z_0 - z_0) - e^{-\frac{2\eta}{\sigma^2}(z - z_0)} + e^{-\frac{2\eta}{\sigma^2}(z - z_0)} \right] & \text{for } z \geq z_0.
\end{cases}
\]

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Next consider the case $\sigma = 0$. Then the solution of equation (1.29) subject to the two boundary conditions is given by

$$
\Gamma(z_0, \delta, \bar{z}, z) = \begin{cases} 
0 & \text{for } z_0 \leq z, \\
\frac{1}{\delta} \left[ 1 - \exp \left( -\frac{\delta}{\mu} (z - z_0) \right) \right] & \text{for } z_0 > z.
\end{cases}
$$

This formula is valid for $\delta > 0$. Taking the limit as $\delta \to 0$ yields

$$
\Gamma(z_0, 0, \bar{z}, z) = \begin{cases} 
0 & \text{for } z_0 \leq z, \\
\frac{z - z_0}{\mu} & \text{for } z_0 > z.
\end{cases}
$$

Notice that $\Gamma(z_0, \delta, \bar{z}, \bar{z}) = \frac{1}{\delta} \left[ 1 - \exp \left( -\frac{\delta}{\mu} (\bar{z} - z_0) \right) \right]$ for $\delta > 0$ and $\frac{z - z_0}{\mu}$ for $\delta = 0$. Substituting into equation (1.28) yields

$$
\bar{\Psi}(z, z_0, \bar{z}) = \begin{cases} 
\frac{\exp \left( -\frac{\delta}{\mu} (z - z_0) \right) - \exp \left( -\frac{\delta}{\mu} (\bar{z} - z_0) \right)}{1 - \exp \left( -\frac{\delta}{\mu} (\bar{z} - z_0) \right)} & \text{for } z \leq z \leq z_0, \\
1 & \text{for } z \geq z_0,
\end{cases}
$$

for $\delta > 0$ and

$$
\bar{\Psi}(z, z_0, \bar{z}) = \begin{cases} 
\frac{z - z_0}{\mu} & \text{for } z \leq z \leq z_0, \\
1 & \text{for } z \geq z_0.
\end{cases}
$$

Having computed the distribution function $\Psi(y, y)$ in closed form, it is straightforward but tedious to verify that $\Psi(y, y^H)$ strictly first order stochastically dominates $\Psi(y, y^L)$. ■

### 1.6.3 Proof of Lemma 4

**Lemma 4** 1. For each level of labor market regulation $\lambda \in [0, 1]$ the conditions (1.4)–(1.8) have a unique solution $(U(\lambda), V(\lambda), h(\lambda))$.

2. The functions $U(\lambda), V(\lambda)$ and $h(\lambda)$ are continuous on $[0, 1]$.

**Proof.** In Lemma 3 it was shown that $y^*$ is strictly increasing and onto $[0, +\infty)$, so $\bar{V}_0 \equiv (y^*)^{-1}(y_0)$ is well defined and positive. By the definition of $\hat{S}$ and the properties of $S$ and $y^*$ established in Lemmas 1 and 3 it follows that $\hat{S}(0) > 0$, $\hat{S}'(V) \in (-1, 0)$ for $V < \bar{V}_0$ and $\hat{S}(V) = 0$ for $V \geq \bar{V}_0$. Similarly using Lemma 2, $\hat{Q}(0) > 0$, $\hat{Q}'(V) < 0$ for $V < \bar{V}_0$ and
$\dot{Q}(V) = 0$ for $V \geq V_0$. This properties of $\dot{S}$ and $\dot{Q}$ will be used repeatedly in this proof.

First, consider the case $R(\lambda) - T(\lambda) + (1 - \beta(\lambda))\dot{S}(R(\lambda)) - c_I \leq 0$. Then the triple $(U,V,h) = (0,R(\lambda),0)$ satisfies the conditions (1.4)--(1.8). To see that this is the only solution, suppose the triple $(U,V,h)$ satisfies the conditions (1.4)--(1.8). The right hand side of condition (1.7) is nonnegative, so $U \geq 0$. Suppose $h > 0$. Then

$$R(\lambda) - T(\lambda) + (1 - \beta(\lambda))\dot{S}(U + R(\lambda)) - c(h)$$

$$< R(\lambda) - T(\lambda) + (1 - \beta(\lambda))\dot{S}(R(\lambda)) - c_I \leq 0.$$

This violates condition (1.6), which requires that $R(\lambda) - T(\lambda) + (1 - \beta(\lambda))\dot{S}(U + R(\lambda)) - c(h) = 0$.

Second, consider the case $R(\lambda) - T(\lambda) + (1 - \beta(\lambda))\dot{S}(R(\lambda)) - c_I > 0$. Notice that this inequality can only hold if $\dot{S}(R(\lambda)) > 0$, and it follows that $R(\lambda) < V_0$. Now suppose the triple $(U,V,h)$ satisfies the conditions (1.4)--(1.8). If $h = 0$ then $U = 0$ from equation (1.7) and consequently $V = R(\lambda)$ from equation (1.8). Then equation (1.5) reads $R(\lambda) - T(\lambda) + (1 - \beta(\lambda))\dot{S}(R(\lambda)) - c_I \leq 0$, which is violated. Thus it must be the case that $h > 0$.

Now if $T(\lambda) + \varphi\dot{Q}(R(\lambda)) + \beta(\lambda)\dot{S}(R(\lambda)) = 0$, then equations (1.7)--(1.8) together imply that $U = 0$ and $V = R(\lambda)$. Then condition (1.6) requires that

$$R(\lambda) - T(\lambda) + (1 - \beta(\lambda))\dot{S}(R(\lambda)) - c(h) = 0.$$

The left hand side is strictly positive for $h = 0$, strictly decreasing in $h$ and approaches minus infinity as $h$ goes to infinity. As a consequence there is a unique $h > 0$ satisfying this condition and the triple $(0,R(\lambda),h)$ obtained in this way satisfies the conditions (1.4)--(1.8).

If instead $T(\lambda) + \varphi\dot{Q}(R(\lambda)) + \beta(\lambda)\dot{S}(R(\lambda)) > 0$, then $U$ cannot be zero since this would violate the pair of conditions (1.7)--(1.8). Then condition (1.7) can be rewritten as $h = \frac{rU}{T(\lambda) + \varphi\dot{Q}(U + R(\lambda)) + \beta(\lambda)\dot{S}(U + R(\lambda))}$, and substituting into equation (1.6) gives the condition

$$R(\lambda) - T(\lambda) + (1 - \beta(\lambda))\dot{S}(U + R(\lambda))$$

$$- c \left( \frac{rU}{T(\lambda) + \varphi\dot{Q}(U + R(\lambda)) + \beta(\lambda)\dot{S}(U + R(\lambda))} \right) = 0.$$
The left hand side is positive for \( U = 0 \) and decreasing in \( U \). As \( U \) converges to \( V_0 - R(\lambda) \) the surplus \( S(U + R(\lambda)) \) goes to zero while creation costs are strictly larger than \( c_I \) and increasing. Thus the left hand side turns negative. So there is a unique \( U \in (0, V_0 - R(\lambda)) \) satisfying this condition and the triple

\[
\left( U, U + R(\lambda), \frac{rU}{T(\lambda) + \varphi Q(U + R(\lambda)) + \beta(\lambda)S(U + R(\lambda))} \right)
\]

obtained in this way satisfies the conditions (1.4)–(1.8).

1.6.4 Proof of Lemma 6

**Lemma 6** The set of Condorcet winners \( C(\lambda_0) \) is contained in the set of politically relevant alternatives \( \Lambda \) for all \( \lambda_0 \in [0, 1] \).

**Proof.** Suppose \( \lambda \not\in \Lambda \). By the definition of the set \( \Lambda \) there exists \( \bar{\lambda} > \lambda \) such that \( U(\bar{\lambda}) > U(\lambda) \). The assumption that the regulation level one minimizes \( U \) together with continuity of \( U \) then implies that there exists \( \bar{\bar{\lambda}} > \bar{\lambda} \) such that \( U(\bar{\bar{\lambda}}) = U(\lambda) \). All employed workers with \( y > y^*(V(\lambda)) \) strictly prefer \( \bar{\lambda} \) over \( \lambda \). Employed workers with \( y \leq y^*(V(\lambda)) \) strictly prefer \( \lambda \) or are indifferent. Now pick \( \lambda' \in [\bar{\lambda}, \bar{\bar{\lambda}}] \) such that \( U(\lambda') > U(\bar{\lambda}) \). All workers with \( y \leq y^*(V(\lambda)) \) strictly prefer \( \lambda' \) over \( \lambda \). However, while all workers with productivity \( y > y^*(V(\lambda)) \) strictly prefer \( \bar{\lambda} \) over \( \lambda \), it is now possible that a group of workers in matches with productivity slightly higher than \( y^*(V(\lambda)) \) does not strictly prefer \( \lambda' \) over \( \lambda \). However, this group can be made as small as desired by choosing \( \lambda' \) such that \( U(\lambda') \) is sufficiently close to \( U(\lambda) \). In other words, for every \( \epsilon > 0 \) there exists \( \lambda' \in [\bar{\lambda}, \bar{\bar{\lambda}}] \) such that \( \nu(\lambda' > \lambda; \lambda_0) > 1 - \epsilon \).

1.6.5 Proof of Proposition 1

I will prove this proposition in two steps. First I will define when an initial regulation level \( \lambda_0 \) provides more support for continuing regulation than an initial regulation level \( \lambda_0' \). Then I prove a lemma, establishing that if \( \lambda_0 \) provides more support for continuing regulation than \( \lambda_0' \), then \( C(\lambda_0) \geq \_C(\lambda_0') \). Finally I use this lemma to prove the proposition.

Once again consider the utility difference \( \Delta(y, \lambda^H, \lambda^L) \). The initial productivity distribution \( \Phi(y, \lambda_0) \) induces a distribution of this utility difference. Let \( \Omega(d, \lambda^H, \lambda^L, \lambda_0) \) be the
associated distribution function.

**Definition 1** Consider two initial regulation levels \( \lambda_0, \lambda'_0 \in \Lambda_0 \). Then \( \lambda_0 \) provides more political support for continuing labor market regulation than \( \lambda'_0 \) if \( \Omega(d, \lambda^H, \lambda^L, \lambda_0) \) strictly first order stochastically dominates \( \Omega(d, \lambda^H, \lambda^L, \lambda'_0) \) for all \( \lambda^H, \lambda^L \in \Lambda \) with \( \lambda^H > \lambda^L \).

**Lemma 7** Consider two initial regulation levels \( \lambda_0, \lambda'_0 \in \Lambda_0 \). If \( \lambda_0 \) provides more political support for continuing labor market regulation that \( \lambda'_0 \), then \( C(\lambda_0) \geq S C(\lambda'_0) \).

**Proof.** Suppose \( \lambda \in C(\lambda_0), \lambda' \in C(\lambda'_0) \) and \( \lambda' > \lambda \). I have to show that both \( \lambda \) and \( \lambda' \) are elements of the intersection \( C(\lambda_0) \cap C(\lambda'_0) \).

Let \( \tilde{\Omega}(0, \lambda', \lambda, \lambda_0) = \lim_{d \downarrow 0} \Omega(0, \lambda', \lambda, \lambda_0) \) be the lefthand limit of \( \Omega(d, \lambda', \lambda, \lambda_0) \) at zero. Then the mass of workers that strictly prefers \( \lambda \) over \( \lambda' \) given initial regulation \( \lambda_0 \) is given by \( \nu(\lambda \succ \lambda'; \lambda_0) = \tilde{\Omega}(0, \lambda', \lambda, \lambda_0) \) while \( \nu(\lambda' \succ \lambda; \lambda_0) = 1 - \Omega(0, \lambda', \lambda, \lambda_0) \) is the mass of workers that strictly prefers \( \lambda' \) over \( \lambda \).

As \( \lambda \in C(\lambda_0) \), it cannot be defeated by \( \lambda' \) given initial regulation \( \lambda_0 \), that is \( \nu(\lambda \succ \lambda'; \lambda_0) \geq \nu(\lambda' \succ \lambda; \lambda_0) \) or

\[
\tilde{\Omega}(0, \lambda', \lambda, \lambda_0) \geq 1 - \Omega(0, \lambda', \lambda, \lambda_0).
\]

Analogously given initial regulation \( \lambda'_0 \)

\[
1 - \Omega(0, \lambda', \lambda, \lambda'_0) \leq \tilde{\Omega}(0, \lambda', \lambda, \lambda'_0).
\]

Since \( \lambda_0 \) provides more support for continuing regulation than \( \lambda'_0 \)

\[
1 - \Omega(0, \lambda', \lambda, \lambda_0) \geq 1 - \Omega(0, \lambda', \lambda, \lambda'_0)
\]

with strict inequality if both \( \Omega(0, \lambda', \lambda, \lambda'_0) > 0 \) and \( \Omega(0, \lambda', \lambda, \lambda_0) < 1 \). It also implies

\[
\tilde{\Omega}(0, \lambda', \lambda, \lambda_0) \leq \tilde{\Omega}(0, \lambda', \lambda, \lambda'_0).
\]
This yields the chain of inequalities

\[ 1 - \Omega(0, \lambda', \lambda, \lambda_0) \geq 1 - \Omega(0, \lambda', \lambda, \lambda_0') \]
\[ \geq \hat{\Omega}(0, \lambda', \lambda, \lambda_0) \]
\[ \geq \hat{\Omega}(0, \lambda', \lambda, \lambda_0) \]
\[ \geq 1 - \Omega(0, \lambda', \lambda, \lambda_0). \]

If both \( \Omega(0, \lambda', \lambda, \lambda_0) > 0 \) and \( \Omega(0, \lambda', \lambda, \lambda_0) < 1 \) the first inequality is strict, yielding a contradiction. If \( \Omega(0, \lambda', \lambda, \lambda_0) = 0 \), then the sequence of inequalities implies \( \hat{\Omega}(0, \lambda', \lambda, \lambda_0) = 1 \), another contradiction. Thus it must be the case that \( \Omega(0, \lambda', \lambda, \lambda_0) = 1 \). This implies that all terms in the sequence of inequalities are zero, that is all workers are indifferent between \( \lambda \) and \( \lambda' \) under both levels of initial regulation. It follows that both \( \lambda \) and \( \lambda' \) are elements of the intersection \( C(\lambda_0) \cap C(\lambda_0') \). \( \blacksquare \)

**Proposition 1** Suppose wages are determined through continuous time Nash bargaining \((\varphi = 0)\). Then labor market regulation exhibits decreasing Condorcet winners on \( \Lambda_0 \).

**Proof.** Consider \( \lambda_0^H, \lambda_0^L \in \Lambda_0 \) with \( \lambda_0^H > \lambda_0^L \). I have to show that \( C(\lambda_0^L) \succeq C(\lambda_0^H) \).

It follows from Lemma 7 that either \( \Phi(y, \lambda_0^L) = \Phi(y, \lambda_0^H) \) or \( \Phi(y, \lambda_0^L) \) strictly first order stochastically dominates \( \Phi(y, \lambda_0^H) \). If \( \Phi(y, \lambda_0^L) = \Phi(y, \lambda_0^H) \), then \( C(\lambda_0^L) = C(\lambda_0^H) \) which implies \( C(\lambda_0^L) \succeq C(\lambda_0^H) \).

So suppose \( \Phi(y, \lambda_0^L) \) strictly first order stochastically dominates \( \Phi(y, \lambda_0^H) \). Consider \( \lambda^H, \lambda^L \in \Lambda \) with \( \lambda^H > \lambda^L \). The utility difference \( \Delta(y, \lambda^H, \lambda^L) \) is continuous and weakly increasing in productivity \( y \). For \( d \in \mathbb{R} \) let \( \bar{y}(d) \equiv \inf \{ y \geq 0 | \Delta(y, \lambda^H, \lambda^L) > d \} \), setting \( \bar{y}(d) = +\infty \) if the set is empty. Then

\[ \Omega(d, \lambda^H, \lambda^L, \lambda_0^H) = \Phi(\bar{y}(d), \lambda_0^H) \quad \text{and} \quad \Omega(d, \lambda^H, \lambda^L, \lambda_0^L) = \Phi(\bar{y}(d), \lambda_0^L). \]

Thus \( \Omega(d, \lambda^H, \lambda^L, \lambda_0^L) \) strictly first order stochastically dominates \( \Omega(d, \lambda^H, \lambda^L, \lambda_0^H) \). By definition 1 it follows that \( \lambda_0^L \) provides more support for continuing regulation that \( \lambda_0^H \).

Then Lemma 7 implies that \( C(\lambda_0^L) \succeq C(\lambda_0^H) \). \( \blacksquare \)
Chapter 2

Trade Integration and the Political Support for Labor Market Rigidity

There is substantial variation in the institutions and policies that countries rely on in organizing production and distribution. A perennial debate in the social sciences is concerned with the question whether international economic integration will eliminate this diversity and induce convergence towards a common model.\(^1\)

One aspect of policy along which countries continue to display considerable variation are labor market rigidities in the form of restrictions on the dismissal of workers.\(^2\) In the popular debate this is an area in which the pressures towards convergence and deregulation are often considered to be particularly strong.\(^3\)

However, while pressures towards convergence feature prominently in the public debate, an argument based on Ricardian trade theory suggests that at least one dimension of eco-

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\(^1\)See for example Berger and Dore (1996) and Kitschelt et al. (1999).

\(^2\)Botero et al. (2003) recently constructed indicators of legal protection against dismissal for a sample of 85 countries. The World Bank (2003) uses their methodology to obtain indicators for a sample of more than 130 countries.

\(^3\)“The tasks are the same everywhere. France is not the only country having to cope with the globalisation of trade. The world has changed for all of us. Flexibility is replacing the old immutable order; adaptability is the cardinal virtue. When seeking to protect oneself from the adverse consequences of change, there is a strong temptation to lean for support on droits acquis-previously acquired rights and entitlements in the workplace. As often before in its history, France shows a particular propensity for doing this. Who fails to see that countries with more flexible labour markets do better in their fight against unemployment? And that unconditional support for droits acquis and the structures of the welfare state damage job creation?” (France former prime minister Edouard Balladur (1997) writing in The Economist)
nomic integration – increasing trade – may actually do the opposite: sustain diversity or even induce further divergence. The structure of this argument is very simple: trade with a flexible country allows a rigid country to specialize in activities less dependent on flexibility, mitigating the cost of rigidity; conversely, trade with a rigid country makes a flexible country less willing to become rigid as well, since doing so would mean forgoing the gains from trade induced by diversity of regulation.

There are two things to note about the Ricardian argument. First, the mechanism is generic: it makes no explicit reference to the features of employment protection, and any other policy could be substituted in its place. Second, the argument is static: once specialization is accomplished, rigidity will be less costly for the rigid country, and the flexible country experiences gains from trade induced by diverse regulation; however, the argument makes no reference to the transitional dynamics of the specialization process.

In this chapter I will study the effect of trade integration on the political support for employment protection, focussing in particular on the applicability of the Ricardian argument outlined above.

Employment protection is inherently a policy designed to affect the dynamic process of labor turnover. Thus I build a dynamic model of job creation and destruction in which employment protection reduces the ability of firms to dismiss workers. In order to create demand for employment protection, I assume that wage setting is such that separations are privately inefficient and premature from the perspective of workers: employed workers value employment protection as a means to delay involuntary dismissals.

On the downside, employment protection reduces productive efficiency by preventing low productivity firms from dismissing their workers. In general equilibrium, lower productive efficiency translates into lower real wages, leaving workers with a trade-off between job duration and wages. Importantly, the drop in average productivity is more severe in sectors with very volatile productivity. This variation of the productivity loss across sectors is a necessary condition for the Ricardian argument to play a role: otherwise differences in regulation would not be a source of gains from trade.4

4Saint-Paul (1997, 2002a) argues that firms producing high-tech goods face a relatively unstable demand for their products and thus are relatively more harmed by restriction on their ability to vary employment levels. Starting from this observation he goes on to construct a model of the international product cycle. While they do not explicitly refer to firing restrictions, Hall and Soskice (2001) present a similar argument: “Agglomeration theory explains why firms engaged in similar
Comparing steady states, the Ricardian mechanism is clearly at work: employment protection reduces steady state productive efficiency; trade with a flexible country mitigates this steady state productivity loss. This is the first channel through which the model links trade and the cost of rigidity. However, the model also features a second channel that arises due to the transitional dynamics induced by integration. Trade integration creates potential gains from trade. Realization of these gains requires reallocation of economic activities across countries, a process that it turn necessitates sectoral reallocation of workers within countries. This reallocation induced by trade integration is an important determinant of the cost of rigidity since employment protection will reduces the speed at which this reallocation can proceed.

How does trade integration affect the support for rigidity? Specifically, how does the generic and static Ricardian argument fare in this dynamic model of employment protection? To discuss the theoretical results of this chapter, it is useful to distinguish between the long run effect of trade on one hand and the impact of the event of trade integration on the other hand.

If a rigid and a flexible country have been trading for a long time, any relocation of sectors across countries induced by trade integration has been completed. This leaves only the Ricardian channel linking trade and the cost of rigidity: given the opportunity to change the extent of employment protection, the rigid country is more willing to maintain rigidity than it would have been in autarky; conversely, the flexible country is more willing to maintain flexibility.

However, in the aftermath of the event of trade integration, the Ricardian mechanism has to contend with the second channel linking trade and the cost of rigidity: the slowdown of the sectoral relocation induced by integration. In order to discuss the impact of trade integration on the support for rigidity, it is helpful to distinguish two groups of workers and firms. First, there are those workers engaged in economic activities that will relocate to a different country in response to integration, henceforth referred to as workers and firms in declining industries. All remaining workers and firms are in the second group, henceforth endeavors cluster in places like Silicon Valley or Baden-Württemberg, but it cannot explain why firms engaged in activities that entail high risks, intense competition, and high rates of labor turnover cluster in Silicon valley, while firms engaged in very different activities that entail low risks, close inter-firm collaboration, and low rates of labor turnover locate in Baden-Württemberg.”
referred to as workers and firms at large.

The model makes sharp predictions about how trade integration affects the distribution of the cost of rigidity across different groups of workers and firms. Perhaps surprisingly, workers and firm at large are completely insulated from the second channel: the speed at which the relocation of sectors across countries unfolds is of no consequence to them. From their perspective, gains from trade are realized immediately in their entirety. Effectively, they are confronted with a static decision between the rigid and the flexible steady state. As a consequence, the Ricardian argument applies with full force to these firms and workers: in the rigid country they support rigidity more willingly, while in the flexible country they provide more ardent support for flexibility.

It follows that the second channel is operative only for workers and firms in declining industries. Jointly, employment relationships in these industries are the losers of trade integration: the real value of their output declines. However, firms and workers in these sectors have strongly opposing views on rigidity. Firms desire to shut down as quickly as possible and oppose regulation that makes it more difficult to do so. Workers are strongly in favor of employment protection since it shelters them from the adverse consequences of integration.

These predictions on the impact of trade integration on the distribution of the cost of rigidity are mapped into predictions about the overall support for employment protection through the distribution of political power. If workers in declining industries are able to rally strong support, trade integration is likely to lead to higher regulation overall. If instead firms in declining industries can muster sufficient influence, the outcome tends to be overall deregulation. Finally, if political power resides mostly with workers and firms at large, the divergent forces associated with the Ricardian mechanism are likely to dominate. Furthermore, as time passes and reallocation unfolds, the second channel gradually loses its strength. Thus the relative importance of the Ricardian mechanism is growing over time.

The Ricardian argument for divergence in its generic and static form has recently made an appearance in the comparative political economy literature. Here I present a more

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5 As argued by Watson (2003), the concept of 'comparative institutional advantage' expounded in Hall and Soskice (2001) has distinctly Ricardian features, which are acknowledged in Hall and Soskice (2003): "Like Ricardo, we argue that economic openness and the more substantial flows of international trade associated with it need not force national economies to converge but can reinforce national diversity instead, by encouraging each country to specialize in what it does best."
formal version of the argument and examine how it applies in an explicitly dynamic model of employment protection. As described above, the model features two channels linking trade and the cost of rigidity: the Ricardian mechanism on one hand and the slowdown of the reallocation induced by integration on the other hand. In order to provide a clear exposition of these two channels, I purposefully shut down other potentially relevant mechanisms. First, I eliminate terms of trade effects. In the presence of terms of trade effects, regulations that reduce domestic productivity are beggar-thy-neighbor policies: the costs are partially borne by trading partners. Since it allows countries to shift part of the costs of rigidity abroad, trade integration works as a force towards more regulation overall through this particular channel. Alessandria and Delacroix (2003) provide a quantitative assessment of the terms of trade effects associated with employment protection. Second, my model does not contain a mechanism through which trade makes the demand for labor more elastic by enhancing competition in product markets. Through this channel trade integration may force workers to bear a larger share of the cost imposed by regulations such as employment protection, creating a force towards overall deregulation. While there appears to be no theoretical examination of this channel in the specific context of employment protection, Koeniger and Vindigni (2003) develop the related argument that deregulation of product markets reduces the demand of employed workers for employment protection.

The remainder of the chapter is organized as follows. In section 2.1 I describes the Ricardian argument in a static setting. Section 2.2 introduces the dynamic model. Section 2.3 analyzes the support for rigidity in autarky. In section 2.4 I begin the examination of the effects of trade by analyzing how it affects the willingness of different groups of workers and firms to support rigidity. The following two sections are concerned with the effect on the overall support for rigidity. In section 2.5 I show that trade makes it more likely that diversity is a long run political equilibrium. Section 2.6 shows how different distributions of political power map into predictions about the impact of the event of trade integration on the support for rigidity. In section 2.7 I consider an extension of the model that allows for other sources of gains from trade. Section 2.8 concludes.

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The informal exposition which is closest to my formalization of the argument is provided by Mosher and Franzese (2001) and Franzese and Mosher (2002).

6The potential importance of this mechanism is discussed in Rodrik (1997). Examples of empirical evaluations of this argument include Slaughter (2001) and Krishna, Mitra, and Chinoy (2001).
2.1 The Ricardian Argument for Divergence

Consider a world with two identical countries, Home and Foreign. A country can be in one of two labor market regimes, rigid $r$ and flexible $f$. The world can be in one of two trade regimes, autarky $A$ and trade $T$.

2.1.1 Technology and Preferences

There are three intermediate goods $z \in Z = \{V, M, S\}$ and one final good. The latter is a Leontief aggregate of the three intermediate goods

$$Y = \min \left[ \frac{y(V)}{\alpha(V)}, \frac{y(M)}{\alpha(M)}, \frac{y(S)}{\alpha(S)} \right]$$

where $\sum_{z \in Z} \alpha(z) = 1$. I let the final good be the numeraire, so the prices of the intermediate goods satisfy $\sum_{z \in Z} \alpha(z)p(z) = 1$. Only the final good is consumed.

In the next section I will model the specifics of employment protection. For now I simply assume that employment protection is a type of regulation that reduces productive efficiency. In a flexible economy one unit of labor employed in sector $z$ produces $\bar{y}^f(z) > 0$ units of output while in a rigid economy it merely produces $\bar{y}^r(z) < \bar{y}^f(z)$. As a measure of this productivity loss, define

$$\bar{\theta}(z) = \frac{\bar{y}^f(z)}{\bar{y}^f(z)}.$$  

The crucial assumption on which the Ricardian argument relies is that the productivity loss associated with employment protection varies across sectors. Specifically, the volatile sector $V$ is affected most, the stable sector $S$ the least, with sector $M$ somewhere in the middle:

$$\theta(V) < \bar{\theta}(M) < \bar{\theta}(S).$$

Of course at this stage the names given to the three sectors are merely labels.

2.1.2 Autarky

First consider the rigid economy. Let $w^n_A$ be its real wage in autarky. The profits per worker of a firm in sector $z$ are given by $p^n_A(z)\bar{y}^r(z) - w^n_A$ where $p^n_A(z)$ is the price of good $z$. Profit maximization requires that firms must make zero profits in equilibrium. Thus
$p_A^T(z)\tilde{y}^T(z) = w_A^T$. It follows that the real wage in autarky is given by

$$w_A^T = w(\tilde{y}^T(V), \tilde{y}^T(M), \tilde{y}^T(S)) = \left[ \frac{\alpha(V)}{\tilde{y}^T(V)} + \frac{\alpha(M)}{\tilde{y}^T(M)} + \frac{\alpha(S)}{\tilde{y}^T(S)} \right]^{-1}. \quad (2.4)$$

The function $w$ is increasing in all its arguments: more efficient production translates into a higher real wage. Analogous computations for the flexible economy yield

$$w_A^f = w(\tilde{y}^f(V), \tilde{y}^f(M), \tilde{y}^f(S)). \quad (2.5)$$

Since rigidity reduces productive efficiency across all sectors it follows that $w_A^f > w_A^T$. A useful way of stating this result is to say that flexibility is associated with a wage premium:

$$\omega_A \equiv \frac{w_A^f}{w_A^T} > 1.$$

Why would workers ever desire employment protection? The dynamic model that will be introduced in section 2.2 will provide an answer to this question, but the simple static framework of this section does not have an ingredient that creates demand for rigidity. So for now let me simply assume that a country adopts employment protection if the flexibility premium falls short of some fixed value $\tilde{\omega} > 1$.

### 2.1.3 Trade

Since the two countries are identical, differences in labor market regimes are the only potential source of gains from trade. Thus if both countries adopt the same regime, the outcome corresponds to autarky. So suppose the two countries adopt different labor market regimes. By symmetry I only need to consider the case in which Home is rigid and Foreign is flexible. I assume that $\alpha(M)$ is sufficiently large such that the middle good $M$ must always be produced in both countries. It is this assumption that rules out any terms of trade effects of employment protection. Let $p_T^f(M)$ be the price of good $M$ if Home is rigid and Foreign is flexible. The zero profit conditions of firms in both countries then imply (foreign values will be indicated by an asterisk throughout the chapter)

$$p_T^f(M) = \frac{w_T^f}{\tilde{y}^f(M)} = \frac{w_T^{f*}}{\tilde{y}^f(M)}. \quad (2.6)$$
This condition determines the relative wage of Foreign and using the definition of $\bar{\theta}(M)$ in equation (2.2) it can be written as

$$\frac{w_T^f}{w_T^{f*}} = \bar{\theta}(M).$$

(2.7)

The sequence of inequalities (2.3) implies that Home has a comparative advantage in the stable sector while Foreign has a comparative advantage in the volatile sector. Thus good $S$ is only produced in Home and the zero profit condition for domestic firms implies

$$p_T^f(S) = \frac{w_T^{f*}}{\bar{g}^r(S)} = \frac{w_T^{f*}}{\bar{g}^r(S)} \frac{\bar{\theta}(M)}{\bar{\theta}(S)} < \frac{w_T^{f*}}{\bar{g}^r(S)}.$$  

(2.8)

The second equality follows from equations (2.2) and (2.7). The inequality implies that production of good $S$ is not profitable in Foreign. Analogously, the price of good $V$ is determined by the zero profit condition of foreign firms:

$$p_T^f(V) = \frac{w_T^{f*}}{\bar{g}^r(V)} = \frac{w_T^{f*}}{\bar{g}^r(V)} \frac{\bar{\theta}(V)}{\bar{\theta}(M)} < \frac{w_T^{f*}}{\bar{g}^r(V)}.$$  

(2.9)

Here the inequality means that the domestic volatile sector is not competitive.

The three prices given in equations (2.6), (2.8) and (2.9) imply real wages

$$w_T^f = w\left(\frac{\bar{\theta}(M)}{\bar{\theta}(V)}, \bar{g}^r(V), \bar{g}^r(S)\right),$$

(2.10)

$$w_T^{f*} = w\left(\bar{g}^r(V), \bar{g}^r(M), \frac{\bar{\theta}(S)}{\bar{\theta}(M)} \bar{g}^f(S)\right).$$

(2.11)

How does trade affect the flexibility premium? The answer to this question depends crucially on the labor market regime of the trading partner.

First suppose Foreign is flexible. If Home chooses to be flexible as well, the outcome corresponds to autarky and the real wage in Home is given by $w_T^f = w_A^f$. In autarky choosing rigidity is associated with the wage $w_A^r$, now it yields the wage $w_T^{f*}$. Comparing equations (2.4) and (2.10) reveals that the only difference between the wages $w_A^r$ and $w_T^{f*}$ stems from different productivity in the volatile sector. Specifically, the productivity loss induced by rigidity is $\bar{\Theta}(V)$ in autarky, but under trade it is only $\bar{\Theta}(M)$. The reason is that under trade, Home no longer needs to produce the volatile good itself. Instead it can
produce more of good $M$, and exchange it for good $V$ produced abroad. As a consequence, the productivity loss in sector $M$ now also applies to sector $V$. Thus trade reduces the cost of rigidity, thereby reducing the flexibility premium:

$$\omega^I_T \equiv \frac{w^I_T}{w^I_f} < \omega_A. \quad (2.12)$$

The superscript $f$ of $\omega^I_T$ indicates that this is the flexibility premium that applies if the trading partner is flexible.

Next consider the situation of Foreign given that Home is rigid. If Foreign chooses to be rigid as well, the outcome corresponds to autarky and the real wage in Foreign is given by $w^r_T = w^r_A$. Choosing flexibility in autarky entails a wage $w^f_T$, under trade it yields the wage $w^r_T$. In autarky choosing flexibility yields only a small productivity gain $\bar{\theta}(S)$ in the stable sector. Under trade Foreign can produce more of the middle good $M$ and exchange it for good $S$ produced in Home. Thus as reflected by equations (2.5) and (2.11), the effective productivity gain flexibility causes in sector $S$ under trade is given by $\bar{\theta}(M)$. It follows that trade with a rigid partner increases the flexibility premium:

$$\omega^r_T \equiv \frac{w^r_T}{w^r^*_T} > \omega_A. \quad (2.13)$$

### 2.1.4 World Political Equilibrium

I assume that as in autarky, rigidity is adopted if the flexibility premium falls short of the fixed value $\bar{\omega}$.

A pair of labor market regimes $(\lambda, \lambda^*)$ will be called a world political equilibrium if $\lambda$ is adopted in Home given that Foreign chooses $\lambda^*$ and $\lambda^*$ is adopted in Foreign given that Home chooses $\lambda$.

By symmetry, both countries adopt the same regime in autarky. Under trade this need not be the case. In particular, the diverse outcomes $(r, f)$ and $(f, r)$ are world political equilibria if

$$\omega^f_T \leq \bar{\omega} \quad \text{and} \quad \omega^r_T > \bar{\omega}.$$

Clearly trade makes diversity more likely. On the flip side, trade makes the homogeneous outcomes $(r, r)$ and $(f, f)$ less likely. Consider an entirely flexible world $(f, f)$. In autarky
this is a political equilibrium if $\omega_A > \bar{\omega}$. The corresponding condition under trade is $\omega_T > \bar{\omega}$, which is more restrictive since trade reduces the flexibility premium when the trading partner is flexible. An analogous argument applies to the entirely rigid outcome $(r, r)$.

2.1.5 Discussion

In this section I have used a static framework to argue that trade can induce divergence in employment protection regulation through a mechanism based on Ricardian comparative advantage. The principal shortcoming of this argument is that it is not based on an explicit model of employment protection. The loss in productive efficiency induced by employment protection is assumed rather than derived. Furthermore, employment protection serves no purpose from the perspective of workers. In the remainder of this chapter I will address these shortcomings by analyzing the effect of trade on the support for rigidity in a dynamic model of labor turnover and employment protection.

2.2 A Dynamic Model

Again consider a world with two identical countries, Home and Foreign, three intermediate goods $z \in Z = \{V, M, S\}$ and one final good. Each country has a continuum of identical workers with mass one and a large mass of entrepreneurs that can start a firm by hiring a worker.

2.2.1 Basic Features

Preferences. Only the final good is consumed. All agents have linear utility with discount rate $r$: the utility of a consumption stream $C(t)$ is given by $\int_0^\infty e^{-rt}C(t)dt$.

Technology. A firm is created when an entrepreneur hires a single worker. Creation is costless and entry is free. A firm within industry $z$ can have high productivity $y(z, h) = 1$ or low productivity $y(z, l) = \theta(z)$. Firms are created with high productivity but transit into the low productivity state at rate $\gamma > 0$. I assume that the severity of the productivity drop associated with falling into the low state varies across sectors. It is most dramatic in
the volatile sector $V$ and least significant in the stable sector $S$:

$$\theta(V) < \theta(M) < \theta(S).$$  \hfill (2.14)

The final good is a Leontief aggregate of the three intermediate goods as in equation (2.1). The assumption of Leontief technology is one of three assumptions that keeps the analysis of transitional dynamics tractable.

**Wage Setting.** I assume the following specification of wage determination: let $U(t)$ be the utility of an unemployed worker at time $t$; then the wage rate received by an employed worker at time $t$ is given by

$$w(t) = (1 + q)rU(t)$$  \hfill (2.15)

where $q > 0$. Thus workers must be paid a fixed multiplicative markup over the utility flow received by unemployed workers. This specification of wage setting is adapted from Saint-Paul (2000, p. 110).\footnote{The only difference is that Saint-Paul uses the additive specification $w(t) = rU(t) + q$. Notice that the parameter $q$ captures the extent to which labor markets are imperfect. With an additive specification any improvement in productivity reduces the extent to which labor markets are imperfect unless $q$ is somehow indexed to productivity. Trade is essentially an improvement in productivity. I do not want trade to have a direct effect on the extent of labor market imperfection. This is what I achieve by adopting a multiplicative specification.} It is a simple way of introducing a labor market imperfection that makes workers value employment protection. Since a worker earns a fixed markup per unit of time as long as he is employed, he clearly wants to keep his job as long as possible. When separation does occur, it is privately inefficient and premature from the perspective of the worker. Employment protection makes it more difficult for firms to dismiss workers. Through this channel it benefits employed workers by extending the duration of jobs.

I rule out bonding by assumption: workers cannot buy there way into jobs. Together with this assumption, the specification of wage setting implies that there must be unemployment: due to the markup $q$ employed workers are better off than unemployed workers; if unemployed workers were hired instantaneously without having to make a bonding payment, they would not be worse off than employed workers; it follows that the duration of unemployment must be positive.
Labor Market Regulation. As in section 2.1 there are two labor market regimes, rigid $r$ and flexible $f$. Employment protection determines the ease at which firms can dismiss workers. In the rigid economy dismissal is difficult: if a firm wants to dismiss its worker, separation occurs only at a slow rate $\phi^r$. In the flexible economy separation occurs at an accelerated rate $\phi^f \gg \phi^r$. Notice that I assume that even in the flexible economy it is not possible to dismiss workers instantaneously. This is the second of three assumptions that keep the analysis of transitional dynamics tractable.

Trade Regimes. As in section 2.1 there are two trade regimes, autarky $A$ and trade $T$. At a point in time the world economy is in one of those two regimes, but now the trading regime may change. In particular, a single once and for all change in the trade regime may occur at time $t = 0$. Changes in the trade regime are exogenous. The trade regime prevailing before time $t = 0$ is denoted as $\tau_0 \in \{A, T\}$, the regime prevailing thereafter is denoted as $\tau$. I restrict attention to three of the four possible sequences of trade regimes. The sequence $(\tau_0, \tau) = (A, A)$ will be referred to as continuing autarky, $(T, T)$ as continuing trade and $(A, T)$ as trade integration.

Politics. Concurrent with the possible change in the trade regime, both countries have a once and for all opportunity to change their labor market regime at time $t = 0$. Home inherits a labor market regime $\lambda_0 \in \{r, f\}$ from the past, Foreign inherits the regime $\lambda_0^*$. 

Dynamics. The only change in parameters the world economy may experience occurs at time $t = 0$, potentially consisting of both a change in the trade regime as well as in the labor market regimes of the two countries. The change in the trading regime and the opportunity to change regulation are both assumed to arise unanticipatedly. At time $t = 0$ the world is assumed to be in the steady state induced by the triple of initial regimes $\rho_0 \equiv [\tau_0, \lambda_0, \lambda_0^*]$.

When making the decision about labor market regulation at time $t = 0$, agents do take into account the transitional dynamics the change in regimes entails. Equilibrium paths considered in this chapter will have the property that prices and utility levels will immediately jump to their new steady state values. Employment levels will adjust slowly, however. Thus along an equilibrium path the utility of the unemployed in Home will be constant at some value $U$ and the wage will be constant at $w = (1 + q)rU$. Goods prices
$p(z), z \in Z$ are constant as well. Utilities and prices in Foreign will likewise be constant along the equilibrium path.

### 2.2.2 Firm Decisions

In this subsection I analyze the entry and exit decision of firms. Let $\phi$ be the dismissal rate. It is given by $\phi^r$ and $\phi^f$ in a rigid and a flexible economy, respectively. Here I consider the problem of the firm given an arbitrary positive value of $\phi$.

Consider a low productivity firm in sector $z$. It faces an output price $p(z)$ and a wage $w$. Its profit flow is given by $\theta(z)p(z) - w$. If the profit flow is positive, the firm will retain the worker and the value of the firm is simply the present value of the profit flow, discounted at rate $r$. If the profit flow is negative, then the firm dismisses the worker and separation occurs at rate $\phi$. The value of the firm is still the present value of the profit flow, but now discounted at the rate $r + \phi$:

$$J(z, l, p(z), w, \phi) = \begin{cases} \frac{p(z)\theta(z) - w}{r + \phi}, & p(z)\theta(z) \leq w, \\ \frac{p(z)\theta(z) - w}{r}, & p(z)\theta(z) > w. \end{cases}$$  \hspace{1cm} (2.16)

The profit flow of a high productivity firm in sector $z$ is given by $p(z) - w$. However, it bases its dismissal decision on the flow $p(z) - w + \gamma J(z, l, p(z), w, \phi)$, which is adjusted for the capital gain experienced upon falling into the low state. If the profit flow of a low productivity firm is negative, then falling into the low state is associated with a capital loss. In this case the adjusted profit flow of a high productivity firm is positive if and only if $\tilde{y}(z, \phi)p(z) \geq w$, where

$$\tilde{y}(z, \phi) \equiv \frac{r + \phi + \gamma \theta(z)}{r + \phi + \gamma}.$$

is a measure of average productivity over the remaining lifetime of the firm, taking into account that the firm initiates dismissal upon falling into the low state (so the weight put on $\theta(z)$ is very small if $\phi$ is high, i.e. if dismissal is easy). If the adjusted profit flow is negative, the firm already initiates dismissal in the high state and the value of the firm is simply the present value of the adjusted flow, discounted at rate $r + \phi + \gamma$. Otherwise it retains the worker, and the value of the firm is obtained by discounting at rate $r + \gamma$. If the profit flow of a low productivity firm is positive, it is clear that the adjusted flow of a
high productivity firm must be positive as well. The firm retains the worker and the value
is again obtained by discounting the adjusted flow at rate $r + \gamma$. However, now the firm
will retain the worker upon falling into the low state, which is reflected in the measure of
average productivity $\bar{y}(z, 0) = \frac{r + \gamma g(z)}{r + \gamma}$. It follows that the value of a high productivity firm
is given by

$$J(z, h, p(z), w, \phi) = \begin{cases} 
\frac{p(z)\bar{y}(z, \phi) - w}{r + \phi}, & p(z)\bar{y}(z, \phi) \leq w, \\
\frac{r + \phi + \gamma p(z)\bar{y}(z, \phi) - w}{r + \phi}, & p(z)\theta(z) \leq w \leq p(z)\bar{y}(z, \phi), \\
\frac{p(z)\bar{y}(z, 0) - w}{r}, & p(z)\theta(z) \geq w. 
\end{cases} \tag{2.17}$$

2.2.3 Rigidity and Productivity

If a sector experiences hiring along the equilibrium path, then the condition $p(z)\bar{y}(z, \phi) = w$
must hold. Thus $\bar{y}(z, \phi)$ is a measure of average productivity in a sector that remains
active along the equilibrium path. Now define $\bar{y}^r(z) \equiv \bar{y}(z, \phi^r)$ and $\bar{y}^l(z) \equiv \bar{y}(z, \phi^l)$. As in
equation (2.2) of section 2.1, let $\bar{\theta}(z) \equiv \frac{\bar{y}^r(z)}{\bar{y}^l(z)}$ be a measure of the severity of the productivity
loss associated with rigidity. Then the ordering in equation (2.14) of the productivity drop
experienced upon falling into the low state translates into an ordering of the productivity
loss induced by employment protection:

$$\bar{\theta}(V) < \bar{\theta}(M) < \bar{\theta}(S).$$

This reproduces the ordering of equation (2.3) in section 2.1. However, now the produc-
tivity loss induced by rigidity is not directly assumed. Instead it follows from the effect of
employment protection on the process of labor turnover.

2.2.4 Worker Utility

The utility of an employed worker depends on three things: the wage $w$ received while
employed, the utility received when unemployed $U$ and the incidence of job loss. However,
recall that the wage $w$ and utility $U$ are linked through the wage setting equation $w = (1 + q)rU$. It is useful to write this relationship as $U(w) \equiv \frac{w}{(1+q)r}$. Using this relation the
utility of an employed worker can be determined from the wage and the incidence of job
loss alone.
Let $\phi$ be the dismissal rate. A worker can have two statuses with respect to the incidence of job loss. The first status is labelled $d$ and corresponds to the situation in which the worker is a candidate for dismissal. The second status corresponds to the situation in which the firm currently retains the worker but will make him a candidate for dismissal if it falls into the low productivity state. This status is labelled $e$ since currently the firm is willing to keep the worker employed.

Let $W(d, w, \phi)$ be the utility of a worker of status $d$ if the wage is $w$. As long as the worker remains employed, he continues to receive the wage. However, since he is a candidate for dismissal he loses his job at rate $\phi$. Thus his utility is given by

$$W(d, w, \phi) = \frac{w + \phi U(w)}{r + \phi} = \left[1 + \frac{r}{(r + \phi)q}\right]\frac{w}{(1 + q)r}. \quad (2.18)$$

A retained worker transits to status $d$ at rate $\gamma$, so his utility can be written as

$$W(e, w, \phi) = \frac{w + \gamma W(d, w, \phi)}{r + \gamma} = \left[1 + \frac{(r + \phi + \gamma)}{(r + \phi + \gamma)}\frac{r}{(r + \phi)q}\right]\frac{w}{(1 + q)r}. \quad (2.19)$$

In obvious notation one can write

$$W(d, w, \phi) = \psi(d, \phi)w \quad \text{and} \quad W(e, w, \phi) = \psi(e, \phi)w.$$

The unemployed can be included in this formulation by writing $W(u, w) \equiv \psi(u)w$ where $\psi(u) = \frac{1}{(1+q)r}$, which is of course merely another restatement of the wage setting equation. Finally, let $\psi^r(d) \equiv \psi(d, \phi^r)$ and $\psi^f(d) \equiv \psi(d, \phi^r)$, defining $\psi^r(e)$ and $\psi^f(e)$ analogously.

### 2.2.5 The Hiring Rate

If an unemployed worker is hired along the equilibrium path, he acquires a job of status $e$: he will be retained until the firm receives a negative productivity shock. For simplicity I assume that unemployed workers do not receive any utility flow, so the return to being unemployed consists solely of the capital gain experienced in the event of hiring:

$$rU(w) = a(\phi)(W(e, w, \phi) - U(w)).$$
where $a(\phi)$ is the hiring rate. Using equation (2.19) and the definition of $U(w)$, the hiring rate can be written as

$$a(\phi) = \frac{(r + \gamma)(r + \phi)}{(r + \phi + \gamma)} q.$$  \hfill (2.20)

Let $a^* \equiv a(\phi^*)$ and $a^f \equiv a(\phi^f)$ be the hiring rates of a rigid and a flexible economy, respectively. It is easily verified that

$$a^f > a^*.$$

This is the standard result that employment protection not only reduces outflows from employment but also depresses hiring.

### 2.3 Autarky

In this section I study the political support for rigidity in countries that are in autarky throughout. Thus the sequence of trade regimes is $(\tau_0, \tau) = (A, A)$. This case will serve as a benchmark when I examine the effects of trade on the support for rigidity in sections 2.4–2.6.

#### 2.3.1 Real Wages

In autarky all goods must be produced, so the entry condition must be satisfied with equality for all sectors. Therefore in the rigid economy prices and the wage satisfy the relationship $p_A(x)\bar{y}^*(x) = w_A^r$. Thus the real wage is once again given by equation (2.4) of section 2.1:

$$w_A^r = w(\bar{y}^r(V), \bar{y}^r(M), \bar{y}^r(S)).$$

Similarly, equation (2.5) gives the real wage of an autarkic flexible economy

$$w_A^r = w(\bar{y}^f(V), \bar{y}^f(M), \bar{y}^f(S)).$$

As in section 2.1, flexibility is associated with a wage premium $\omega_A \equiv \frac{w_A^f}{w_A^r} > 1$. 

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2.3.2 Transitional Dynamics

As mentioned before, prices and utility levels immediately jump to their new steady state levels at time \( t = 0 \). However, there are transitional dynamics in employment levels, which I will briefly describe in this subsection. Along the equilibrium path, low productivity firms dismiss workers at rate \( \phi \). High productivity firms retain their workers but transit into the low state at rate \( \gamma \). Unemployed workers are hired at rate \( a(\phi) \). The only remaining question is: how are newly hired workers allocated to the sectors \( V, M \) and \( S \)? The answer follows from the assumption that the final good is a Leontief aggregate. Thus the three intermediate goods must be produced in fixed proportions along the equilibrium path.\(^8\) This provides two restrictions that pin down the sectoral allocation of hiring. A detailed discussion of transitional dynamics in autarky is provided in Appendix 2.9.1, along with a derivation of steady state employment levels.

2.3.3 The Political Support for Rigidity

In this subsection I discuss the conditions under which different groups of workers and firms support rigidity in autarky.

**Workers.** Rows one to three of table 1 display the support provided by workers. The first row is concerned with workers in high productivity firms. Since all sectors experience

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\(^8\)For the path discussed in the text to be an equilibrium, initial production levels must be in the correct proportions as well. This is insured by the assumption that the economy is in steady state at time \( t = 0 \).
entry under both labor market regimes, these workers have status \( e \) both under rigidity and flexibility: currently they are retained, but they become candidates for dismissal once the firm falls into the low state. They support rigidity if the gain from delayed dismissal outweighs the flexibility premium, that is if \( \frac{\psi'(c)}{\psi'(e)} \geq \omega_A \).

The second row derives the analogous condition for workers in low productivity firms. These workers are candidates for dismissal under both labor market regimes. Under these circumstances the gain from delayed dismissal is given by \( \frac{\psi'(d)}{\psi'(d)} \).

Unemployed workers do not benefit from delayed dismissal but they do suffer from the fall in productive efficiency induced by rigidity. As recorded in the third row of the table, they always oppose employment protection.

**Firms.** Since all sectors experience entry both in the flexible and the rigid economy, the value of high productivity firms is zero irrespective of the labor market regime. As recorded in the fourth row of the table, these firms are indifferent.

Given a binding entry condition in its sector, the value of a low productivity firm is given by

\[
J(z, l, [\bar{g}(z, \phi)]^{-1} w, w, \phi) = -\frac{1 - \theta(z)}{r + \phi + \gamma} w
\]

Thus in the rigid economy it is given by \( J^r_A(z, l) = -\frac{1 - \theta(z)}{r + \phi^r + \gamma} w_A^r \) while the corresponding value in the flexible economy is \( J^f_A(z, l) = -\frac{1 - \theta(z)}{r + \phi^f + \gamma} w_A^f \). Both are negative. Rigidity has two effects. First, it depresses the real wage, which increases the value of low productivity firms. Second, it reduces the dismissal rate, diminishing their value. However, I will make an assumption that resolves this ambiguity. Throughout the chapter I will think of \( \phi^r \) as being close to zero and of \( \phi^f \) as being very large. Thus I will treat any effect that arises because \( \phi^r \) is not zero or because \( \phi^f \) is not infinite as second order in the sense of being to small to affect political decisions. Here this assumption implies that \( J^f_A(z, l) \approx 0 \): while firms cannot shut down instantaneously in the flexible economy, they can do so rather quickly and accumulated losses are negligible. On the other hand, in the rigid economy these firms have a hard time of shutting down, and accumulated losses are relatively large. Hence low productivity firms oppose rigidity, a result recorded in the last row of the table.
2.4 Trade

In this section I discuss how trade affects the support for rigidity of different groups of workers and firms. Subsections 2.4.1-2.4.3 serve as preparation: I derive real wages under trade, discuss transitional dynamics and examine how trade affects initial employment levels. As in the static model of section 2.1, the support for rigidity depends crucially on the labor market regime of the trading partner. In subsection 2.4.4 I examine the effect of trade on the support for rigidity provided by different groups of firms and workers if the trading partner is flexible. Subsection 2.4.5 performs the same task if the trading partner is rigid. The section concludes with a discussion of the perhaps surprising result that workers and firms at large are completely insulated from the slowdown of relocation associated with rigidity.

2.4.1 Real Wages

As in section 2.1, only real wages in the case \((r, f)\) must be computed: if both countries choose the same regime, the outcome corresponds to autarky, and autarky wages were computed in subsection 2.3.1; the case \((f, r)\) is covered by symmetry.

So suppose Home is rigid while Foreign is flexible. In section 2.1 I assumed that the amount of the middle good \(M\) required to produce the final good is sufficiently large such that the middle good must be produced in both countries. Here I make an analogous assumption: \(\alpha(M)\) is sufficiently large such that along the equilibrium path there must be entry into sector \(M\) in both countries. As its analog in section 2.1, this assumption eliminates terms of trade effects of employment protection. It is also the final of three assumptions that keep the analysis of transitional dynamics tractable.

With this assumption in place, obtaining real wages for the pair of labor market regimes \((r, f)\) under trade requires no additional work: entry conditions in the dynamic economy correspond exactly to the zero profit conditions in the static economy of section 2.1. It follows that the real wages of Home and Foreign are given by equations (2.10) and (2.11)

\[
    w_T^f = w \left( \frac{\partial(M)}{\partial(V)} \tilde{y}^f(V), \tilde{y}^f(M), \tilde{y}^f(S) \right), \quad w_T^{f*} = w \left( \tilde{y}^f(V), \tilde{y}^f(M), \frac{\partial(S)}{\partial(M)} \tilde{y}^f(S) \right).
\]

Since both real wages and the ordering of the \(\tilde{\theta}(z)\)'s correspond exactly to the static economy,
it follows that the ordering of flexibility premia is the same as well.

2.4.2 Transitional Dynamics

Again only the pair of labor market regimes \((r, f)\) needs to be considered. The middle and the stable sector in Home as well as the volatile and the middle sector in Foreign behave as in autarky: high productivity firms retain their workers but transit into the low productivity state at rate \(\gamma\); low productivity firms dismiss workers at rates \(\phi^c\) and \(\phi^f\) in Home and Foreign, respectively. The domestic volatile and the foreign stable sector are a different matter: these sectors are not competitive, hiring ceases and even high productivity workers are dismissed at rates \(\phi^c\) and \(\phi^f\), respectively. Unemployed workers are hired at rates \(a^c\) and \(a^f\) in Home and Foreign, respectively. How is hiring allocated to sectors? In autarky output proportions have to remain constant along the equilibrium path within each country. Under trade this no longer necessary: now output proportions must remain constant at the world level.\(^9\)

In appendix B I show that these dynamics give rise to a system of linear differential equations. Figure 2-1 displays an example in which the two countries are initially in autarky and the initial pair of regulation levels is \((r, f)\) as well (solid and dashed lines correspond to high and low productivity employment, respectively). First consider the stable sector \(S\). The foreign stable sector is no longer competitive. Since Foreign is flexible, employment in this sector is decreasing rapidly. Consequently, the maintenance of constant output proportions requires a quick expansion of the stable sector in Home. Hence for some time most of hiring in Home is allocated to the stable sector. It follows that there is little entry into the domestic sector \(M\), which is reflected in temporarily decreasing employment. This is compensated by more intense hiring of the foreign middle sector. Foreign does have the capacity to devote more hiring to sector \(M\): since Home is rigid, domestic employment in the volatile sector declines much slower than foreign employment in the stable sector; therefore job creation in the foreign volatile sector does not need to be quite as rapid as domestic creation in the stable sector.

\(^9\)As discussed in footnote 8, initial output proportions at the world level must be correct for the path discussed in the text to be a valid equilibrium. This is insured by the assumption that the two economies are in steady state at time \(t = 0\) together with the fact that in this steady state both countries produce the three intermediate goods in the same proportions.
While the system of linear differential equations can always be solved mechanically to obtain a path of employment levels, the path obtained in this fashion need not be a valid equilibrium path. In the example displayed in figure 2-1, domestic job creation is able to keep up with falling employment levels in the foreign stable sector. However, if destruction in flexible Foreign is too rapid, the capacity of Home to create jobs may be insufficient to maintain constant output ratios. In the solution to the system of differential equations this problem shows up as negative hiring levels in the domestic sector $M$, which is inconsistent with equilibrium. I will assume throughout that parameters are such that this problem does not arise. So while I think of the flexible dismissal rate $\phi_f$ as quite high, it cannot be too large.\textsuperscript{10}

\textsuperscript{10}If this problem occurs, it will no longer be an equilibrium for all prices and utility levels to jump immediately to their steady state values, and transitional dynamics become more complicated.
2.4.3 Trade and Initial Conditions

How does trade affect initial employment levels? I will show that it leaves both the aggregate employment rate and the productivity distribution of workers unchanged. Thus it only affects the sectoral composition of the workforce. Let \( L_0(z, h, \rho_0) \) and \( L_0(z, l, \rho_0) \) be initial high and low productivity employment in sector \( z \) as a function of initial conditions \( \rho_0 \). Similarly, let \( L_0(h, \rho_0) \) and \( L_0(l, \rho_0) \) be total employment in high and low productivity firms, respectively. Finally, let \( L_0(\rho_0) \) be aggregate employment. First, aggregate employment only depends on whether the economy is rigid or flexible. Let \( L_0^r \equiv \frac{\alpha^r}{\alpha^r+\phi^r+\gamma} \) and \( L_0^f \equiv \frac{\phi^f}{\alpha^r+\phi^r+\gamma} \). Then

\[
L_0(\tau_0, r, \lambda_o^0) = L_0^r \quad \text{and} \quad L_0(\tau_0, f, \lambda_o^0) = L_0^f
\]

for all initial trade regimes \( \tau_0 \in \{A, T\} \) and foreign initial labor market regimes \( \lambda_o^0 \in \{r, f\} \).

Second, total employment in high and low productivity firms only depends on the labor market regime as well. Let \( L_0^r(h) \equiv \frac{\phi^r}{\phi^r+\gamma} L_0^r, L_0^r(l) \equiv \frac{\gamma}{\phi^r+\gamma} L_0^r, L_0^f(h) \equiv \frac{\phi^f}{\phi^r+\gamma} L_0^f \) and \( L_0^f(l) \equiv \frac{\gamma}{\phi^r+\gamma} L_0^f \). Then

\[
L_0(h, [\tau_0, r, \lambda_o^0]) = L_0^r(h), \quad L_0(l, [\tau_0, r, \lambda_o^0]) = L_0^f(l), \quad (2.21)
\]

\[
L_0^*(h, [\tau_0, \lambda, f]) = L_0^f(h), \quad L_0^*(l, [\tau_0, \lambda, f]) = L_0^f(l). \quad (2.22)
\]

for all initial trade regimes \( \tau_0 \in \{A, T\} \) and initial labor market regimes \( \lambda, \lambda_o^0 \in \{r, f\} \).

The reason for this neutrality of trade is straightforward: along the equilibrium path of any rigid economy, unemployed workers are hired at rate \( \alpha^r \), high productivity firms transit into the low state at rate \( \gamma \), and low productivity firms dismiss workers at rate \( \phi^r \). These transition rates are all the information needed to determine the initial employment levels above. Of course this result depends crucially on the assumption that transition rates do not vary across sectors. Thus it only plays the role of a benchmark.

However, trade clearly has important effects on the sectoral allocation of the workforce. In particular, if the initial pair of labor market regimes is \((r, f)\), then both domestic initial employment in the volatile and foreign initial employment in the stable sector are zero. Let \( L_0(z, \rho_0) \) be total initial employment in sector \( z \). Then

\[
L_0(V, [T, r, f]) = L_0^*(S, [T, r, f]) = 0.
\]
### Table 2.2: Support for rigidity given a flexible trading partner

<table>
<thead>
<tr>
<th></th>
<th>$V$</th>
<th>$M$</th>
<th>$S$</th>
</tr>
</thead>
<tbody>
<tr>
<td>workers</td>
<td>$h$</td>
<td>$\frac{\psi^r(e)}{\psi^f(e)} \geq \omega_f^r$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$l$</td>
<td>$\frac{\psi^r(d)}{\psi^f(d)} \geq \omega_f^r$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$u$</td>
<td></td>
<td>opposed</td>
</tr>
<tr>
<td>firms</td>
<td>$h$</td>
<td></td>
<td>opposed</td>
</tr>
<tr>
<td></td>
<td>$l$</td>
<td></td>
<td>indifferent</td>
</tr>
</tbody>
</table>

In autarky these employment levels are positive since each country must produce all three intermediate goods.

#### 2.4.4 The Support for Rigidity given a Flexible Trading Partner

In this subsection I determine the political support for rigidity in Home given that Foreign is flexible. At this point it is useful to introduce the distinction alluded to in the introduction: workers and firms in declining industries on one hand and workers and firms at large on the other hand.

**Workers at large.** Workers at large are workers employed in a sector which remains competitive no matter what labor market regime is adopted. Given that Foreign is flexible, in Home these sectors are the stable sector $S$ and the middle sector $M$. Workers at large employed in firms with high productivity have status $e$ independent of the labor market regime. They support rigidity if the benefit from delaying dismissal for workers of this status outweighs the flexibility premium. Given that Foreign is flexible, the applicable flexibility premium is $\omega_f^r$. It follows that these workers support rigidity if $\frac{\psi^r(e)}{\psi^f(e)} > \omega_f^r$. Similarly, workers at large in firms with low productivity support rigidity if the gains from delayed dismissal for status $d$ workers outweigh the flexibility premium: $\frac{\psi^r(d)}{\psi^f(d)} > \omega_f^r$.

**Workers in declining industries.** If Home chooses to be flexible, the outcome corresponds to autarky and high productivity workers in the volatile sector $S$ have status $e$. If Home adopts rigidity, the volatile sector is no longer competitive and even high productivity
workers are candidates for dismissal. It follows that their gain from delayed dismissal is not \( \frac{\psi'(e)}{\psi'(e)} \) (the value for workers at large) but only \( \frac{\psi'(d)}{\psi'(e)} \). However, here I appeal to the assumption that the rigid dismissal rate \( \phi^r \) is close to zero. This implies \( \psi'(d) \approx \psi'(e) \): in a very rigid economy it does not matter much whether the firm is willing to retain a worker or wants to dismiss him. Thus up to this approximation the criterion for the support of rigidity is the same as that of high productivity workers at large: \( \frac{\psi'(e)}{\psi'(e)} \), and as such it is recorded in the first row of table 2. Low productivity workers in declining industries are candidates for dismissal irrespective of the labor market regime, hence they find themselves in the same position as low productivity workers at large.

**Firms at large.** Since entry continues in sectors \( M \) and \( S \) irrespective of the labor market regime, high productivity firms at large are indifferent between rigidity and flexibility. For low productivity firms the discussion from autarky applies: if the dismissal rate under flexibility \( \phi^f \) is sufficiently high, then low productivity firms oppose rigidity.

**Firms in declining industries.** If Home adopts rigidity, then high productivity firms in sector \( V \) are no longer competitive. They would like to dismiss their workers as quickly as possible, but rigidity makes this very difficult. If Home adopts flexibility the value of these firms is zero, so they clearly oppose rigidity. Low productivity firms in sector \( V \) likewise oppose employment protection, given that \( \phi^f \) is sufficiently high.

Comparing tables 1 and 2, it is clear that all employed workers in Home are more willing to support rigidity than under autarky. The gain in from delayed dismissal is unchanged. However, as reflected in the lower flexibility premium \( \omega^f_\Delta < \omega_\Delta \), gains from trade with a flexible Foreign have mitigated the cost of rigidity. The attitude of firms at large towards rigidity is the same in the autarky. However, high productivity firms in declining industries are an additional source of resistance against employment protection.

### 2.4.5 The Support for Rigidity given a Rigid Trading Partner

In this subsection I determine the political support for rigidity in Foreign given that Home is rigid.
Table 2.3: Support for rigidity given a rigid trading partner

<table>
<thead>
<tr>
<th></th>
<th>V</th>
<th>M</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$h$</td>
<td>$l$</td>
<td>$u$</td>
</tr>
<tr>
<td></td>
<td>$\frac{\psi^r(e)}{\psi^f(e)} \geq \omega^r_T$</td>
<td>$\frac{\psi^r(d)}{\psi^f(d)} \geq \omega^r_T$</td>
<td>opposed</td>
</tr>
<tr>
<td></td>
<td>$\frac{\psi^r(d)}{\psi^f(d)} \geq \omega^r_T$</td>
<td>opposed</td>
<td>indifferent</td>
</tr>
</tbody>
</table>

**Workers at large.** If Foreign chooses rigidity, the outcome corresponds to autarky. If it adopts flexibility, the stable sector $S$ becomes uncompetitive, so here workers at large are those employed in the volatile sector $V$ and the middle sector $M$. The discussion for workers at large is the same as in the previous subsection. However, now the flexibility premium given a rigid trading partner $\omega^r_T$ applies.

**Workers in declining industries.** High productivity workers in the stable sector $S$ have status $e$ if Foreign adopts rigidity: the outcome corresponds to autarky and sector $S$ remains competitive. However, if Foreign chooses flexibility, then these workers become candidates for dismissal. Since rigidity improves the status of these workers from $d$ to $e$, they experience a larger gain from delayed dismissal $\frac{\psi^r(e)}{\psi^f(d)}$ than other high productivity workers. Since $\psi^r(e) \approx \psi^r(d)$, it is approximately the same gain as the one experienced by low productivity workers, and as such it is recorded in the table. As always, low productivity workers have status $d$ irrespective of the labor market regime.

**Firms at large.** Once again high productivity firms at large are indifferent, while low productivity firms oppose rigidity for sufficiently high $\phi^f$.

**Firms in declining industries.** If Foreign adopts rigidity, then the stable sector remains competitive, insuring that the value of high productivity firms is zero. However, if Foreign chooses to be flexible, then sector $S$ loses its competitiveness and the value of high productivity firms is negative. Using equations (2.9) and (2.17), in this case the value of
these firms can be written as $J^r_f(S, h) = \frac{1}{\tau + \psi_f} \left[ \frac{\theta(M)}{\theta(S)} - 1 \right] \omega^r_f$. It is negative since even in the flexible economy dismissal is not instantaneous. However, the assumption that $\phi_f$ is very large implies that $J^r_f(S, h) \approx 0$. Notice the contrast to domestic high productivity firms in the volatile sector $V$: if Home adopts rigidity, these sectors become uncompetitive and face difficulties in dismissing their workers. Foreign firms in sector $S$ are in a much better position: if Foreign chooses flexibility, then they become uncompetitive but a high $\phi_f$ allows them to shut down quickly. Consequently, these firms are approximately indifferent between rigidity and flexibility, which is how they are recorded in the fourth row of table 3.

Comparing tables 1 and 3, it is evident that both high productivity workers at large and all low productivity workers are less willing to support rigidity than under autarky. The gains in terms of delayed dismissal are unchanged. However, choosing rigidity eliminates the gains from trade induced by differences in regulation, leading to a higher flexibility premium $\omega^r_T > \omega_A$. The attitude of all firms towards rigidity is unchanged. It remains to discuss high productivity workers in the declining industry $S$. In contrast to all other employed workers, they may actually be more willing to support rigidity than in autarky. This will be the case if the condition $\frac{\psi^r_f(d)}{\psi^r_f(d)} \geq \omega^r_T$ is less restrictive than the condition $\frac{\psi^r(c)}{\psi^r(c)} \geq \omega_A$. This is possible since $\frac{\psi^r_f(d)}{\psi^r_f(d)} > \frac{\psi^r(c)}{\psi^r(c)}$: candidates for dismissal gain more from delayed dismissal that retained workers. If this higher gain from delayed dismissal outweighs the increased flexibility premium, then high productivity workers in sector $S$ are more likely to support rigidity. Otherwise the effect of trade with a rigid partner is unambiguous: the support for rigidity falls.

2.4.6 The Distributional Impact of the Slowdown

For the sake of concreteness consider the following scenario: initially Home is rigid, Foreign is flexible and the trade regime is autarky. Now at time $t = 0$ trade integration occurs and both countries maintain their labor market regime. The diversity in labor market regimes creates gains from trade. But notice that the productive structures do not change instantaneously. The gains from trade are realized only gradually as the transitional dynamics unfold and the volatile sector slowly moves to Foreign while the stable sector travels in the opposite direction. As illustrated in subsection 2.4.2, the fact that Home is rigid slows down the
speed at which this sectoral relocation takes place.

Now consider the counterfactual scenario that in response to a change in trade or labor market regimes, economies move immediately from the old to the new steady state. In this scenario there is no slowdown in the speed of sectoral relocation associated with rigidity. Consider a domestic worker who is employed at time \( t = 0 \). Suppose that this worker maintains his employment status and productivity level, irrespective of which labor market regimes are adopted at time \( t = 0 \).\textsuperscript{11} When will this worker support rigidity? Given that Foreign stays flexible, the domestic wage in the new steady state is \( w^I_T \) or \( w^I_J \), depending on whether Home adopts rigidity or flexibility. The gain from delayed dismissal that the worker obtains in the new steady state is \( \frac{\psi^*(d)}{\psi^*(e)} \) if his productivity is high, \( \frac{\psi^*((d)}{\psi^*((e)} \) if it is low. He supports rigidity if this gain outweighs the flexibility premium.

Notice that this thought experiment leads to the same rules for the support of rigidity as obtained for domestic workers at large in table 2. Thus workers at large essentially choose between steady states. Since prices and wages jump to the new steady state, these workers experience the entire gains from trade immediately, although they are not yet realized. As a consequence, the slowdown of sectoral relocation associated with rigidity is of no concern to these workers. Hence trade integration affects the support for rigidity provided by workers and firms at large only through the Ricardian channel.

It follows that the impact of the slowdown channel must be concentrated on workers and firms in declining industries. Notice that the slowdown need not hurt efficiency: separations are always privately inefficient, and they may also be socially inefficient. Thus slowing down the speed at which the relocation of sectors across countries proceeds could in principle be desirable from the viewpoint of efficiency. However, the distributional implications are clear: workers benefit while firms lose.

Conditional on the property that prices jump to the new steady state immediately, the result that workers and firms at large are insulated from the effects of the slowdown is evident. However, it is perhaps surprising that it is an equilibrium for prices to jump to the new steady state immediately. To what extent is this result an artifact of the special features of this economy? The sharpness of the result depends on three features of the model: (i) the final good is a Leontief aggregate; (ii) terms of trade are pinned down by the

\textsuperscript{11} This will not be possible for all workers if the new steady state to which the economy switches at time \( t = 0 \) has lower employment of high and/or low productivity workers.
middle good $M$ and thus don't move during the transition; (iii) destruction in the flexible economy is not instantaneous.

The pivotal of these features is the first one. If the production function of the final good is CES with a positive elasticity of substitution, then relative prices will not jump to the new steady state at time $t = 0$. Instead they are determined by relative quantities and the world level produced at this point in time. These relative prices will in general not conform to entry conditions. Thus for a while there will not be entry into all three sectors, until relative quantities at the world level are rebalanced in such a way that relative prices are in agreement with the entry conditions of competitive sectors (sectors $M$ and $S$ in Home as well as $V$ and $M$ in Foreign). Once this rebalancing act is completed, entry conditions take over and the remaining transition is the same as in the Leontief case. The key thing to notice is that typically the rebalancing of quantities at the world level will be completed much more quickly that the process of relocating sectors across countries, in particular the devolution of the volatile sector in Home. Thus at the point in time at which entry conditions take over, prices are at their new steady state level while most of the reallocation needed to realize gains from trade has yet to occur. The Leontief assumption merely constitutes the case in which the short rebalancing period is eliminated entirely, which makes this assumption very convenient for analytical purposes.

A less technical description of the basic economic force at work goes at follows: in response to trade integration, consumers benefit from inexpensive imports almost immediately; firms in declining industries must match the lower price of competitors abroad, so in essence these firms must finance gains from trade experienced by consumers which have not yet materialized; the burden of slowing down the realization of gains from trade through rigidity is borne by firms in declining industries: they have to finance the discrepancy between the gains experienced by consumers and those actually realized for a longer period of time.

### 2.5 The Long Run Effect of Trade

In this section I will show that trade makes it more likely that the diverse outcome $(r, f)$ is a long run political equilibrium. First I will define what I mean by a long run political equilibrium. The first step is to aggregate the political support for rigidity. I do so by
assigning weights to each distinct group of workers and firms. A group of workers has the weight \( \mu \) times the number of its members. Similarly, a group of firms has the weigh \( \nu \) times the number of workers that its members employ. If a group prefers rigidity, its weight enters the aggregate support positively. If it is opposed, its weight enters negatively. Indifferent groups are not counted. I assume that a country adopts rigidity if the aggregate support exceeds a fixed level \( \bar{\Sigma} \).

Let \( \Sigma_A(\rho_0) \) be the aggregate support for rigidity in Home if the future trade regime is autarky \( A \) and initial conditions are given by \( \rho_0 \). Similarly, let \( \Sigma_f^*(\rho_0) \) be the domestic aggregate support for rigidity given a flexible trading partner; and let \( \Sigma_T^*(\rho_0) \) denote the foreign aggregate support if its trading partner is rigid.

Suppose the sequence of trade regimes is continuing autarky \( (\tau_0, \tau) = (A, A) \) and that the initial pair of regulation levels is \((\lambda, \lambda^*)\). Then \((\lambda, \lambda^*)\) is said to be a stationary political equilibrium in autarky if it confirmed in the political decision at time \( t = 0 \), that is if Home and Foreign maintain \( \lambda \) and \( \lambda^* \), respectively. Thus \((r, f)\) is a stationary political equilibrium in autarky if

\[
\Sigma_A([A, r, f]) \geq \bar{\Sigma} \quad \text{and} \quad \Sigma_A^*[A, r, f]) < \bar{\Sigma}. \tag{2.23}
\]

Analogously, if \((\lambda, \lambda^*)\) is confirmed given that the sequence of trade regimes is continuing trade \( (\tau_0, \tau) = (A, A) \), then \((\lambda, \lambda^*)\) is said to be a stationary political equilibrium under trade. The pair of labor market regimes \((r, f)\) satisfies this definition if

\[
\Sigma_T^f([T, r, f]) \geq \bar{\Sigma} \quad \text{and} \quad \Sigma_T^*[T, r, f]) < \bar{\Sigma}. \tag{2.24}
\]

The first inequality requires that Home adopts rigidity given that Foreign is flexible. The second inequality demands that Foreign chooses to be flexible given that Home is rigid.

The present model does not feature repeated voting. Thus defining stationary political equilibria in this way is as close as I can get to the notion of a long run political equilibrium. I will now show that trade makes it more likely that the diverse outcome \((r, f)\) is a stationary political equilibrium: condition (2.23) is more restrictive than condition (2.24).

The argument has two steps. First, I show that trade increase the support for rigidity at home: \( \Sigma_T^f([T, r, f]) \geq \Sigma_A([A, r, f]) \). Recall the comparison of tables 1 and 2 at the end of subsection 2.4.4. All groups of firms and workers provide equal or more support under trade
with a flexible partner than under autarky, with one exception: high productivity firms in
the declining industry \( V \). The crucial feature of the initial conditions \([T, r, f]\) is that this
group of firms does not exist: if countries were trading in the past, Home was rigid and
Foreign was flexible, then specialization has already taken place and domestic employment
in the volatile sector is zero. More formally

\[
\Sigma_T^f([T, r, f]) - \Sigma_A([A, r, f]) = \mu \left[ \sigma \left( \frac{\psi^r(e)}{\psi^f(e)} - \omega^r_T \right) - \sigma \left( \frac{\psi^r(e)}{\psi^f(e)} - \omega_A \right) \right] L_0^f(h) \\
+ \mu \left[ \sigma \left( \frac{\psi^r(d)}{\psi^f(d)} - \omega^r_T \right) - \sigma \left( \frac{\psi^r(d)}{\psi^f(d)} - \omega_A \right) \right] L_0^r(l) \geq 0. \tag{2.25}
\]

Here the function \( \sigma(\cdot) \) gives the sign of its argument. \(^{12}\) In computing this difference in
support levels, I have used the result of subsection 2.4.3 that only the labor market regime
matters for aggregate employment and the productivity distribution of the workforce: both
in autarky and under trade, initial high and low productivity employment is given by \( L_0^f(h) \)
and \( L_0^r(l) \), respectively. The unemployed and firms do not appear in the support difference
since trade does not change their mind about rigidity. The sign of the support difference
follows from the fall in the flexibility premium: since \( \omega^f_T < \omega_A \), both terms in square brackets
are nonnegative.

The second step is to show that trade increases resistance against rigidity in Foreign:
\( \Sigma_T^f([T, r, f]) \leq \Sigma_A([A, r, f]) \). Recall the comparison of tables 1 and 3 at the end of subsection
2.4.5. All groups of firms and workers provide equal or more resistance under trade
with a rigid partner than under autarky, with one possible exception: high productivity
workers in the declining industry \( S \). Yet once again the initial conditions \([T, r, f]\) imply
that this group of workers does not exist since specialization has already taken place. Thus

\[
\Sigma_T^f([T, r, f]) - \Sigma_A([A, r, f]) = \mu \left[ \sigma \left( \frac{\psi^r(e)}{\psi^f(e)} - \omega^r_T \right) - \sigma \left( \frac{\psi^r(e)}{\psi^f(e)} - \omega_A \right) \right] L_0^f(h) \\
+ \mu \left[ \sigma \left( \frac{\psi^r(d)}{\psi^f(d)} - \omega^r_T \right) - \sigma \left( \frac{\psi^r(d)}{\psi^f(d)} - \omega_A \right) \right] L_0^r(l) \leq 0. \tag{2.26}
\]

\(^{12}\)The function \( \sigma \) is defined as follows: \( \sigma(x) = -1 \) for \( x < 0 \); \( \sigma(x) = 0 \) for \( x = 0 \); \( \sigma(x) = 1 \) for
\( x > 0 \).
2.6 The Impact of Trade Integration

In section 2.4 I obtained sharp predictions about how trade affects the distribution of the costs of rigidity. In the previous section I compared the sequences of trade regimes continuing autarky \((A, A)\) and continuing trade \((T, T)\), and I demonstrated that trade makes it more likely that diversity \((r, f)\) is a long run political equilibrium.

In this section I turn to the impact of the event of trade integration on the overall support for rigidity, i.e. I will compare the sequences of trade regimes continuing autarky \((A, A)\) and trade integration \((A, T)\). Under both sequences of trade regimes, the initial regime is autarky. Thus both countries have positive initial levels of employment in all three sectors. As a consequence, the result for the long run effect of trade obtained in the preceding section does not hold for the event of trade integration: I cannot show that in general trade integration makes the diverse outcome \((r, f)\) more likely. Integration does not unambiguously increase the support for rigidity in Home (given a flexible Foreign): now there is a mass of high productivity firms in the volatile sector that increase their resistance against employment protection. Similarly, integration does not unambiguously reduce the support for rigidity in Foreign (given a rigid Home): there is mass of high productivity workers in the stable sector that may provide more ardent support for rigidity.

It follows that the overall effect of trade integration will depend on the distribution of political power. In this section I will therefore relax the assumption that all groups of workers have the same weight \(\mu\) while all firms enter with the same weight \(\nu\). Instead I allow distinct groups of firms and workers to have different weights.

Specifically, I will consider three extreme scenarios. In the first scenario worker in declining industries are able to rally strong political support, enabling them to determine the political outcome. In the second scenario it is firms in declining industries that can muster sufficient influence to determine the labor market regime. In the third and final scenario, the influence of special interest groups is very low, and the political outcome is determined by workers and firms at large.

2.6.1 Powerful Workers in Declining Industries

Given a rigid trading partner, high productivity workers in the stable sector \(S\) are the only reason why trade integration may not reduce the support for rigidity. Moreover, as discussed
at the end of section 2.4.5, these workers will only increase their support for rigidity if the condition \( \frac{\psi'(e)}{\psi'(r)} \geq \omega_A \) is more restrictive than the condition \( \frac{\psi'(d)}{\psi'(d)} \geq \omega_T \). In this subsection I consider the situation in which this is the case. In addition, I assume that high productivity workers in the stable sector are sufficiently powerful to be pivotal. It is very easy to see that under these circumstances, trade integration makes it more likely that overall rigidity \((r, r)\) is a world political equilibrium: in autarky \((r, r)\) is a political equilibrium if \( \frac{\psi'(e)}{\psi'(e)} \geq \omega_A \); under trade integration it is an equilibrium if \( \frac{\psi'(d)}{\psi'(d)} \geq \omega_T \). By construction of the scenario, the second condition is less restrictive.

### 2.6.2 Powerful Firms in Declining Industries

Given a flexible trading partner, high productivity firms in the volatile sector \( V \) are the only reason why trade integration does not unambiguously increase the support for rigidity. In this subsection I consider the case in which this group of firms can muster sufficient influence in order to be pivotal in the political decision, in the sense that rigidity is adopted unless opposed by these firms. It is easy to see that under these circumstances, trade integration insures that overall flexibility \((f, f)\) is a political equilibrium. Consulting table 1, autarky leaves high productivity firms in the volatile sector indifferent between rigidity and flexibility. It follows that a rigid world \((r, r)\) is the political equilibrium. Table 2 shows that given a flexible trading partner, these firms will change their mind in response to integration: rigidity both destroys their competitiveness and makes it difficult to shut down. It follows that trade integration makes overall flexibility \((f, f)\) a political equilibrium.

### 2.6.3 Political Power resides with Workers and Firms at large

In this subsection I consider the case in which political power resides with workers and firms at large. Specifically, I assume that the political decision is made by workers and firms in sector \( M \). Notice that one can think of sector \( M \) as including nontradables, so it is reasonable to think of it as being large, in particular if trade integration is partial. The assumption that political power resides with workers and firms in sector \( M \) then reflects a situation in which the political system gives little clout to special interest groups such as firms and workers in declining industries. Within sector \( M \) I return to the assumption that workers have weight \( \mu \) while firms have weight \( \nu \). I will show that trade integration makes
it more likely that the diverse outcome \((r, f)\) is a political equilibrium at time \(t = 0\). In autarky \((r, f)\) is an equilibrium if

\[
\Sigma_A([A, \lambda, \lambda^*]) \geq \bar{\Sigma} \quad \text{and} \quad \Sigma_A^*([A, \lambda, \lambda^*]) < \bar{\Sigma}.
\] (2.27)

Initial regulation levels \((\lambda, \lambda^*)\) will not play a role in the argument, so they are left unspecified. Apart from this, condition (2.27) is identical to condition (2.23) of section 2.5. Under trade integration \((r, f)\) is an equilibrium if

\[
\Sigma_T^f([A, \lambda, \lambda^*]) \geq \bar{\Sigma} \quad \text{and} \quad \Sigma_T^f([A, \lambda, \lambda^*]) < \bar{\Sigma}.
\] (2.28)

This condition corresponds to condition (2.24) of section 2.5. However, notice the difference that the initial trade regime is autarky \(A\) and not trade \(T\). This simplifies the argument: there is no need to refer to the results of subsection 2.4.3 on the effects of trade on initial employment levels, since here initial conditions are identical across the two conditions (2.27) and (2.28). Apart from this simplification, the argument is parallel to the one given in section 2.5. Specifically, the result follows from the analogs of equations (2.25) and (2.26), which are obtained by replacing overall employment levels with the levels of employment in sector \(M\) induced by the initial conditions \([A, \lambda, \lambda^*]::

\[
\Sigma_T^f([T, r, f]) - \Sigma_A([A, r, f])
= \mu \left[ \sigma \left( \frac{\psi^r(e)}{\psi^f(e)} - \omega_f^T \right) - \sigma \left( \frac{\psi^r(e)}{\psi^f(e)} - \omega_A \right) \right] L_0(M, h, [A, \lambda, \lambda^*])
+ \mu \left[ \sigma \left( \frac{\psi^r(d)}{\psi^f(d)} - \omega_f^T \right) - \sigma \left( \frac{\psi^r(d)}{\psi^f(d)} - \omega_A \right) \right] L_0(M, l, [A, \lambda, \lambda^*]) \geq 0,
\]

\[
\Sigma_T^r([T, r, f]) - \Sigma_A^r([A, r, f])
= \mu \left[ \sigma \left( \frac{\psi^r(e)}{\psi^f(e)} - \omega_f^T \right) - \sigma \left( \frac{\psi^r(e)}{\psi^f(e)} - \omega_A \right) \right] L_0^r(M, h, [A, \lambda, \lambda^*])
+ \mu \left[ \sigma \left( \frac{\psi^r(d)}{\psi^f(d)} - \omega_f^T \right) - \sigma \left( \frac{\psi^r(d)}{\psi^f(d)} - \omega_A \right) \right] L_0^r(M, l, [A, \lambda, \lambda^*]) \leq 0.
\]
<table>
<thead>
<tr>
<th>workers</th>
<th>Autarky</th>
<th>Flexible Partner</th>
<th>Rigid Partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>$h$</td>
<td>$\frac{\psi^r(e)}{\psi^f(e)} \geq \omega_A$</td>
<td>$\frac{\psi^r(e)}{\psi^f(e)} \geq \omega_f$</td>
<td>$\frac{\psi^r(e)}{\psi^f(e)} \geq \omega_f^r$</td>
</tr>
<tr>
<td>$l$</td>
<td>$\frac{\psi^r(d)}{\psi^f(d)} \geq \omega_A$</td>
<td>$\frac{\psi^r(d)}{\psi^f(d)} \geq \omega_f$</td>
<td>$\frac{\psi^r(d)}{\psi^f(d)} \geq \omega_f^r$</td>
</tr>
<tr>
<td>firms</td>
<td>indifferent</td>
<td>ind.</td>
<td>opp.</td>
</tr>
<tr>
<td>$l$</td>
<td>opposed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 2.4:** Domestic support for rigidity in sectors $H$ and $F$

### 2.7 Other Sources of Gains from Trade

In the model considered in sections 2.2–2.6, differences in labor market regulation are the only source of gains from trade. Rigidity slows down the reallocation needed to realize these gains from trade. I demonstrated that this slowdown is of no concern to workers and firms at large, with the implication that integration affects their taste for rigidity only through the Ricardian channel. However, rigidity only slows down the realization of gains from trade that are itself generated by rigidity. In this section I will consider an extension of the model in which there are other sources of Ricardian gains from trade. These could arise from differences in technologies or variation across countries in policies and institutions other than employment protection.

Employment protection will also reduce the speed at which these additional gains from trade are realized. The purpose of this section is to demonstrate that workers and firms at large are insulated from this slowdown as well. Again its impact is limited to firms and workers in declining industries: workers benefit and firms lose.

The simplest way of introducing other sources of gains from trade while maintaining the symmetry of the model is to add two intermediate goods, called $H$ and $F$. Productivity levels are given by $y(H, h) = 1$, $y(H, l) = \theta(M)$, $y^*(H, h) = \delta$, $y^*(H, l) = \delta\theta(M)$, $y(F, h) = \delta$, $y(F, l) = \delta\theta(M)$, $y^*(F, h) = 1$, $y^*(F, l) = \theta(M)$ where $\delta \in (0, 1)$. Notice that in both sectors the percentage drop in productivity upon falling into the low state is the same as in the middle sector $M$. Thus for $\delta = 1$ the two additional sectors simply become parts of the middle sector. However, for $\delta < 1$ Home has a comparative advantage in good $H$ while
Foreign has a comparative advantage in good $F$.

Trade integration always induces sectors $H$ and $F$ to locate entirely in Home and Foreign, respectively. As before, specialization in sectors $V$ and $S$ only occurs if the two countries adopt different labor market regimes. Computing real wages yields the same ordering of flexibility premia as before: $\omega_T^v > \omega_A > \omega_F^f$. Tables 1–3 remain a valid description of the support for rigidity provided by firms and workers in sectors $V$, $M$ and $S$. To obtain a complete description, these tables must be supplemented with the support by workers and firms in the two new sectors $H$ and $F$. Table 4 provides this information for the Home country, the corresponding information for Foreign is obtained by symmetry. In autarky there is no difference between the support stemming from new and old sectors. The domestic sector $H$ does not relocate in response to integration. Therefore workers and firms in these sectors are part of workers and firms at large, and provide corresponding support for rigidity. The only new element are preferences of workers and firms in sector $F$ under trade. This sector will always relocate to Foreign in response to integration, irrespective of the labor market regime adopted. Thus workers in this sector become candidates for dismissal, hence their gain from delayed separation is given by $\frac{\psi_T^v(d)}{\psi_F^f(d)}$. High productivity firms in sector $F$ lose their competitiveness as a consequence of integration. They would like to shut down quickly and hence oppose rigidity.

All results discussed in sections 2.5 and 2.6 carry over to this extended version of the model. Trade makes it more likely that diversity $(r,f)$ is a stationary political equilibrium. The impact of trade integration depends on the distribution of political power. Importantly, workers and firms at large are once again insulated from the slowdown in the realization of gains from trade associated with rigidity, where gains from trade now stem both from differences in regulation as well as other sources.

### 2.8 Concluding Remarks

In this chapter I have studied the effects of trade integration on the political support for employment protection. In particular, I have examined how the generic and static Ricardian argument fares in an explicit dynamic model of labor turnover and employment protection. Explicit modelling of dynamics has highlighted a second channel linking trade integration and the costs of rigidity: the slowdown of the sectoral relocation induced by integration.

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I have demonstrated that the effects of this slowdown are limited to workers and firms in declining industries. Workers and firms at large are essentially left with a static choice between the rigid and the flexible steady state, so for these workers the Ricardian mechanism applies with full force. Furthermore, I have shown how these sharp distributional implications map into predictions concerning the impact of trade integration on the overall support for rigidity through the distribution of political power. To conclude, I would like to outline two avenues for future research.

In the analysis of this chapter I have taken trade integration as exogenous. It is a natural extension of the model to let trade opening to be a political choice as well. I conjecture this will strengthen the Ricardian argument for divergence. In my analysis, the force of the Ricardian mechanism was limited by the political power of workers and firms in declining industries. Agents in declining industries oppose integration. Thus if integration occurs endogenously, this suggests that agents in declining industries must be weak.

In this chapter I have focussed on one aspect of labor market rigidity, restrictions on dismissals, taking as given a second aspect, namely rigidities in wage determination. In particular, I have assumed a specification of wage setting that gives rise to privately inefficient separations. In the model, this aspect of wage setting is the reason why by employed workers may support rigidity. However, the extent to which separations are privately inefficient is itself influenced by policies: minimum wages and collective bargaining limit the ability of firms and workers to make privately efficient separation decisions. Freeman (2000) recently presented some suggestive evidence of increasing diversity in wage setting institutions (as measured by the percentage of workers covered by collective bargaining) among advanced nations over the last two decades, concurrent with a large increase in the volume of trade among these countries. Thus it should be interesting to examine the applicability of the Ricardian argument to wage policies. Furthermore, there are reasons to believe that wage policies and employment protection are complements: as discussed above, wage rigidity induces workers to demand restrictions on dismissals; conversely, in the absence of employment protection, firms could circumvent wage policies simply by dismissing workers whose productivity falls short of the required wage. Following this line of reasoning, it would be desirable to analyze labor market rigidity as a syndrome of both restrictions on dismissals

\[13\] This argument is made informally in Bertola and Rogerson (1997).
and wage determination. The theoretical framework developed in this chapter should be well adapted to examine the effects of trade integration on this "package" of labor market rigidities.

2.9 Appendix

2.9.1 Transitional Dynamics under Autarky

Let \( L_A(t, z, h, \rho_0, \phi) \) be employment of high productivity workers in sector \( z \) at time \( t \), given initial conditions \( \rho_0 \) and a dismissal rate \( \phi \). Let \( H_A(t, z, \rho_0, \phi) \) be hiring into this sector at time \( t \). Then employment levels evolve according to

\[
\begin{align*}
\dot{L}_A(t, z, h, \rho_0, \phi) &= H_A(t, z, \rho_0, \phi) - \gamma L_A(t, z, h, \rho_0, \phi), \\
\dot{L}_A(t, z, l, \rho_0, \phi) &= \gamma L_A(t, z, h, \rho_0, \phi) - \phi L_A(t, z, l, \rho_0, \phi).
\end{align*}
\]

(2.29) (2.30)

Newly created firms all have high productivity, so hiring \( H_A(t, z, \rho_0, \phi) \) constitutes the inflow into high productivity employment. The outflow from high productivity employment is given by high productivity firms transiting into the low state. The latter outflow makes up the inflow into low productivity employment. Workers in low productivity firms are candidates for dismissal, and the flow of dismissed workers constitutes the only outflow from low productivity employment.

Hiring into the three sectors has to equal total hiring:

\[
\sum_{z \in Z} H_A(t, z, \rho_0, \phi) = a(\phi) \left[ 1 - \sum_{z \in Z} (L_A(t, z, h, \rho_0, \phi) + L_A(t, z, l, \rho_0, \phi)) \right]
\]

(2.31)

The term in square brackets on the right hand side is unemployment at time \( t \) (recall that the total mass of workers is normalized to one).

High productivity workers produce one unit of output while low productivity workers only produce \( \theta(z) \), so output in sector \( z \) is given by

\[
Y_A(t, z, \rho_0, \phi) = L_A(t, z, h, \rho_0, \phi) + \theta(z)L_A(t, z, l, \rho_0, \phi).
\]

(2.32)

Since the final good is a Leontief aggregate, the intermediate goods must be produced in
fixed proportions:

\[
\frac{Y_A(t, V, \rho_0, \phi)}{\alpha(V)} = \frac{Y_A(t, M, \rho_0, \phi)}{\alpha(M)} = \frac{Y_A(t, S, \rho_0, \phi)}{\alpha(S)}.
\] (2.33)

This is only possible if initial conditions satisfy this restriction as well. But this will always be the case by virtue of the assumption that the economy is in steady state at time \( t = 0 \).

Differentiating equation (2.32) yields

\[
\dot{Y}_A(t, z, \rho_0, \phi) = \dot{L}_A(t, z, h, \rho_0, \phi) + \theta(z) \dot{L}_A(t, z, l, \rho_0, \phi).
\] (2.34)

Substituting from equations (2.29)–(2.30) gives

\[
\dot{Y}_A(t, z, \rho_0, \phi) = H_A(t, z, \rho_0, \phi) - \gamma(1 - \theta(z))L_A(t, z, h, \rho_0, \phi) - \phi \theta(z)L_A(t, z, l, \rho_0, \phi).
\] (2.35)

Equation (2.33) implies

\[
\dot{Y}_A(t, z, \rho_0, \phi) = \alpha(z) \sum_{z' \in Z} Y_A(t, z', \rho_0, \phi).
\] (2.36)

Substituting from equation (2.35) this can be written as

\[
\dot{Y}_A(t, z, \rho_0, \phi) = \alpha(z) \sum_{z' \in Z} H_A(t, z', \rho_0, \phi)
\]

\[
- \alpha(z) \sum_{z' \in Z} \left[ \gamma(1 - \theta(z'))L_A(t, z', h, \rho_0, \phi) + \phi \theta(z')L_A(t, z', l, \rho_0, \phi) \right]
\] (2.37)

and using equation (2.31)

\[
\dot{Y}_A(t, z, \rho_0, \phi) = \alpha(z) \theta(\phi) \left[ 1 - \sum_{z' \in Z} (L_A(t, z', h, \rho_0, \phi) + L_A(t, z', l, \rho_0, \phi)) \right]
\]

\[
- \alpha(z) \sum_{z' \in Z} \left[ \gamma(1 - \theta(z'))L_A(t, z', h, \rho_0, \phi) + \phi \theta(z')L_A(t, z', l, \rho_0, \phi) \right]
\] (2.38)

---

**Note:** If condition (2.33) were violated by initial conditions, then it would not be an equilibrium for prices and utility levels to jump to their steady state levels immediately and transitional dynamics would be more complicated. But this situation never arises here. It would arise if the sequence of trade regimes were \((\pi_0, \tau) = (T, A)\), i.e. if countries trade initially but then are exogenously and unanticipatedly prevented from continuing to do so. In this situation a country will be specialized at time \( t = 0 \) and will only slowly create capacity to produce the good previously imported. However, I do not consider this sequence of trade regimes.
Combining this with equation (2.35) yields

\[
H_A(t, z, \rho_0, \phi) = \alpha(z) \alpha^r \left[ 1 - \sum_{z' \in Z} (L_A(t, z', h, \rho_0, \phi) + L_A(t, z', l, \rho_0, \phi)) \right] \\
+ \left[ \gamma (1 - \theta(z)) L_A(t, z, h, \rho_0, \phi) + \phi \theta(z) L_A(t, z, l, \rho_0, \phi) \right] \\
- \alpha(z) \sum_{z' \in Z} \left[ \gamma (1 - \theta(z')) L_A(t, z', h, \rho_0, \phi) + \phi \theta(z') L_A(t, z', l, \rho_0, \phi) \right] 
\]

(2.39)

Using this equation to eliminate \( H_A(t, z, \rho_0, \phi) \), the following dynamic system is obtained:

\[
\dot{L}_A(t, z, h, \rho_0, \phi) = \alpha(z) \alpha^r \left[ 1 - \sum_{z' \in Z} (L_A(t, z', h, \rho_0, \phi) + L_A(t, z', l, \rho_0, \phi)) \right] \\
+ \theta(z) \phi L_A(t, z, l, \rho_0, \phi) - \gamma L_A(t, z, h, \rho_0, \phi) \\
- \alpha(z) \sum_{z' \in Z} \left[ \gamma (1 - \theta(z')) L_A(t, z', h, \rho_0, \phi) + \phi \theta(z') L_A(t, z', l, \rho_0, \phi) \right] ,
\]

\[
\dot{L}_A(t, z, l, \rho_0, \phi) = \gamma L_A(t, z, h, \rho_0, \phi) - \phi L_A(t, z, l, \rho_0, \phi).
\]

This system does not have full rank. Alone it is not sufficient to compute the steady state.

Imposing \( \dot{L}_A(t, z, h, \rho_0, \phi) = \dot{L}_A(t, z, l, \rho_0, \phi) = 0 \) for \( z \in Z \) merely determines total steady state employment in high and low productivity jobs

\[
\sum_{z \in Z} L_0(z, h, [A, \lambda, \lambda_0^*]) = \frac{\phi^\lambda}{\phi^\lambda + \gamma a(\phi^\lambda)} \frac{a(\phi^\lambda)}{\phi^\lambda + \gamma},
\]

(2.40)

\[
\sum_{z \in Z} L_0(z, l, [A, \lambda, \lambda_0^*]) = \frac{\gamma}{\phi^\lambda + \gamma a(\phi^\lambda)} \frac{a(\phi^\lambda)}{\phi^\lambda + \gamma},
\]

(2.41)

and the steady state ratio of high and low productivity jobs within sectors:

\[
L_0(z, l, [A, \lambda, \lambda_0^*]) = \frac{\gamma}{\phi^\lambda} L_0(z, h, [A, \lambda, \lambda_0^*])
\]

(2.42)

for \( z \in Z \). As the initial trade regime is autarky, initial employment levels in Home do not depend on whether Foreign has been rigid or flexible in the past. This is indicated by letting the value of \( \lambda_0^* \) be unspecified in equations (2.40)–(2.42). To determine sectoral
employment levels, use equation (2.32) to write

$$Y_0(z, [A, \lambda, \lambda_0^*]) = \frac{\phi^+ + \gamma \theta(z)}{\phi} L_0(z, h, [A, \lambda, \lambda_0^*]) = \tilde{y}(z, \phi) \frac{\phi^+ + \gamma}{\phi} L_0(z, h, [A, \lambda, \lambda_0^*]).$$

where \(\tilde{y}(z, \phi) \equiv \frac{\phi^+ \gamma \theta(z)}{\phi \phi^+ + \gamma}.\) Together with equation (2.33) this implies

$$\tilde{y}(V, \phi^+) L_0(V, h, [A, \lambda, \lambda_0^*]) = \tilde{y}(M, \phi^+) L_0(M, h, [A, \lambda, \lambda_0^*]) = \frac{\tilde{y}(L, \phi^+)}{\alpha(L)} L_0(L, h, [A, \lambda, \lambda_0^*])$$

and combining these relationships with equation (2.40) yields

$$L_0(z, h, [A, \lambda, \lambda_0^*]) = \frac{1}{\tilde{y}(z, \phi^+)} \frac{\phi^+}{\phi} \frac{\alpha^+}{a} L_0(z, h, [A, \lambda, \lambda_0^*]) = \frac{\alpha(z)^{\phi^+}}{\alpha(z)^{\phi^+} + \gamma a(z)^{\phi^+}}$$

where \(\tilde{y}(z, \phi) \equiv \left[ \frac{\alpha(z)}{\sum_{z' \in z} \alpha(z')^{\phi^+} \beta(z')^{\phi^+}} \right]^{\phi^+} \).

### 2.9.2 Transitional Dynamics under Trade

Only the case in which Home is rigid and Foreign is flexible needs to be considered. There is entry along the equilibrium path in the domestic sectors \(M\) and \(S\) and in the foreign sectors \(V\) and \(M\). Consequently the dynamics of these sectors are governed by equations (2.29)–(2.30), with dismissal rates \(\phi^r\) and \(\phi^f\) for domestic and foreign sectors, respectively.

Dynamics are different for sector \(V\) in Home and sector \(S\) in Foreign. First, entry into these sectors is zero: \(H^r_V(t, V, \rho_0) = H^r_S(t, S, \rho_0) = 0\). Second, workers in high productivity firms are dismissed at rates \(\phi^r\) and \(\phi^f\), respectively. Thus employment levels in these two sectors follow

$$\dot{L}_T^r(t, V, h, \rho_0) = -\phi^r L_T^r(t, V, l, \rho_0), \quad \text{(2.43)}$$

$$L_T^r(t, V, l, \rho_0) = \gamma L_T^r(t, V, h, \rho_0) - \phi^r L_T^r(t, V, l, \rho_0), \quad \text{(2.44)}$$

$$\dot{L}_T^f(t, S, h, \rho_0) = -\phi^f L_T^f(t, S, l, \rho_0), \quad \text{(2.45)}$$

$$L_T^f(t, S, l, \rho_0) = \gamma L_T^f(t, S, h, \rho_0) - \phi^f L_T^f(t, S, l, \rho_0). \quad \text{(2.46)}$$

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World output in sector \( z \) is given by

\[
Y_T^{rf}(t, z, \rho_0) = L_T^{rf}(t, z, h, \rho_0) + L_T^{rf*}(t, z, h, \rho_0) + \theta(z) \left[ L_T^{rf}(t, z, l, \rho_0) + L_T^{rf*}(t, z, l, \rho_0) \right]
\]

and now output proportions must remain constant at the world level:

\[
\frac{Y_T^{rf}(t, V, \rho_0)}{\alpha(V)} = \frac{Y_T^{rf}(t, M, \rho_0)}{\alpha(M)} = \frac{Y_T^{rf}(t, S, \rho_0)}{\alpha(S)}.
\]

Differentiating equation (2.47) and substituting from equations (2.29)–(2.30) and (2.43)–(2.46) yields

\[
\dot{Y}_T^{rf}(t, V, \rho_0) = H_T^{rf}(t, V, \rho_0) - (\phi^* + \gamma) L_T^{rf}(t, V, h, \rho_0) - \gamma L_T^{rf*}(t, V, h, \rho_0)
\]

\[
+ \theta(V) \left\{ \gamma \left[ L_T^{rf}(t, V, h, \rho_0) + L_T^{rf*}(t, V, h, \rho_0) \right] - \phi^* L_T^{rf}(t, V, l, \rho_0) - \phi^* L_T^{rf*}(t, V, l, \rho_0) \right\}
\]

\[
\dot{Y}_T^{rf}(t, M, \rho_0) = H_T^{rf}(t, M, \rho_0) + H_T^{rf*}(t, M, \rho_0)
\]

\[
- \gamma L_T^{rf}(t, M, h, \rho_0) - \gamma L_T^{rf*}(t, M, h, \rho_0)
\]

\[
+ \theta(M) \left\{ \gamma \left[ L_T^{rf}(t, M, h, \rho_0) + L_T^{rf*}(t, M, h, \rho_0) \right] - \phi^* L_T^{rf}(t, M, l, \rho_0) - \phi^* L_T^{rf*}(t, M, l, \rho_0) \right\}
\]

\[
\dot{Y}_T^{rf}(t, S, \rho_0) = H_T^{rf}(t, S, \rho_0) - \gamma L_T^{rf}(t, S, h, \rho_0) - (\phi^* + \gamma) L_T^{rf*}(t, S, h, \rho_0)
\]

\[
+ \theta(S) \left\{ \gamma \left[ L_T^{rf}(t, S, h, \rho_0) + L_T^{rf*}(t, S, h, \rho_0) \right] - \phi^* L_T^{rf}(t, S, l, \rho_0) - \phi^* L_T^{rf*}(t, S, l, \rho_0) \right\}
\]

To eliminate \( H_T^{rf}(t, M, \rho_0) \) and \( H_T^{rf*}(t, M, \rho_0) \), use the conditions \( H_T^{rf}(t, V, \rho_0) = 0 \) and \( H_T^{rf*}(t, S, \rho_0) = 0 \) to simplify the adding up condition (2.31) for each country and rewrite them as

\[
H_T^{rf}(t, M, \rho_0) = a^f \left[ 1 - \sum_{z \in Z} (L_T^{rf}(t, z, h, \rho_0) + L_T^{rf*}(t, z, l, \rho_0)) \right] - H_T^{rf}(t, S, \rho_0),
\]

\[
H_T^{rf*}(t, M, \rho_0) = a^f \left[ 1 - \sum_{z \in Z} (L_T^{rf*}(t, z, h, \rho_0) + L_T^{rf*}(t, z, l, \rho_0)) \right] - H_T^{rf*}(t, V, \rho_0)
\]

Differentiating (2.48), one can use the resulting two equalities to solve out for \( H_T^{rf}(t, S, \rho_0) \)
and \( H^T_{fi}(t, V, \rho_0) \) as functions of the twelve sectoral employment levels. First define

\[
\mathcal{L}^f_T(t, \rho_0) = \begin{bmatrix}
L^f_T(t, V, h, \rho_0) \\
L^f_T(t, V, l, \rho_0) \\
L^f_T(t, M, h, \rho_0) \\
L^f_T(t, M, l, \rho_0) \\
L^f_T(t, S, h, \rho_0) \\
L^f_T(t, S, l, \rho_0)
\end{bmatrix}
\]

Then

\[
H^T_{fi}(t, S, \rho_0) = \alpha(S)[a^r + a^f] \\
\begin{bmatrix}
\alpha(S)a^r + \alpha(S)[\phi^r + \gamma(1 - \theta(V))] \\
\alpha(S)a^r + \alpha(S)\phi^r \theta(V) \\
\alpha(S)a^r + \alpha(S)\gamma(1 - \theta(M)) \\
\alpha(S)a^r + \alpha(S)\phi^r \theta(M) \\
\alpha(S)a^r - (1 - \alpha(S))\gamma(1 - \theta(S)) \\
\alpha(S)a^r - (1 - \alpha(S))\phi^r \theta(S)
\end{bmatrix} \cdot \begin{bmatrix}
\mathcal{L}^f_T(t, \rho_0) \\
\mathcal{L}^f_{i*}(t, \rho_0)
\end{bmatrix},
\]

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\[ H_{T}^{f*}(t, V, \rho_0) = \alpha(V)[\alpha_r + \alpha_f] \]

\[ = \begin{bmatrix}
\alpha(V)\alpha_r - (1 - \alpha(V))\phi_r + \gamma(1 - \theta(V)) \\
\alpha(V)\alpha_r - (1 - \alpha(V))\phi_r \theta(V) \\
\alpha(V)\alpha_r + \alpha(V)\gamma(1 - \theta(M)) \\
\alpha(V)\alpha_r + \alpha(V)\phi_r \theta(M) \\
\alpha(V)\alpha_r + \alpha(V)\gamma(1 - \theta(S)) \\
\alpha(V)\alpha_r + \alpha(V)\phi_r \theta(S) \\
\alpha(V)\alpha_f - (1 - \alpha(V))\gamma(1 - \theta(V)) \\
\alpha(V)\alpha_f - (1 - \alpha(V))\phi_f \theta(V) \\
\alpha(V)\alpha_f + \alpha(V)\gamma(1 - \theta(M)) \\
\alpha(V)\alpha_f + \alpha(V)\phi_f \theta(M) \\
\alpha(V)\alpha_f + \alpha(V)[\phi_f + \gamma(1 - \theta(S))] \\
\alpha(V)\alpha_f + \alpha(V)\phi_f \theta(S)
\end{bmatrix}
\begin{bmatrix}
\mathcal{L}_{T}^{f}(t, \rho_0) \\
\mathcal{L}_{T}^{f*}(t, \rho_0)
\end{bmatrix}.

Substituting into equations (2.49)–(2.50) yields both \( H_{T}^{f}(t, M, \rho_0) \) and \( H_{T}^{f*}(t, M, \rho_0) \) as functions of the twelve sectoral employment levels. Finally, using these results to eliminate the hiring level from equations (2.29)–(2.30) yields a system of linear differential equations

\[ \begin{bmatrix}
\dot{\mathcal{L}}_{T}^{f}(t, \rho_0) \\
\dot{\mathcal{L}}_{T}^{f*}(t, \rho_0)
\end{bmatrix} = \alpha_r + B_r \begin{bmatrix}
\mathcal{L}_{T}^{f}(t, \rho_0) \\
\mathcal{L}_{T}^{f*}(t, \rho_0)
\end{bmatrix}.
\]

To state the steady state employment levels, define

\[ \Delta_{T}^{r} = \frac{\tilde{y}_{r}(M)}{\alpha(M)} \frac{\tilde{y}_{f}(V)}{\alpha(V)} + \frac{\tilde{y}_{r}(M)}{\alpha(M)} \frac{\tilde{y}_{f}(M)}{\alpha(M)} + \frac{\tilde{y}_{r}(S)}{\alpha(S)} \frac{\tilde{y}_{f}(M)}{\alpha(M)}. \]
Then

\[ L_0(M, [T, r, f]) = \left[ \Delta_T^f \right]^{-1} \left\{ \frac{\tilde{y}^r(S)}{\alpha(S)} \left[ \frac{\tilde{y}^f(V)}{\alpha(V)} + \frac{\tilde{y}^f(M)}{\alpha(M)} \right] L_0^r - \frac{\tilde{y}^f(V) \tilde{y}^f(M)}{\alpha(V) \alpha(M)} L_0^f \right\} \]

\[ L_0(S, [T, r, f]) = \left[ \Delta_T^f \right]^{-1} \left\{ \left[ \frac{\tilde{y}^r(M)}{\alpha(M)} \frac{\tilde{y}^f(V)}{\alpha(V)} + \frac{\tilde{y}^r(M) \tilde{y}^f(M)}{\alpha(M) \alpha(M)} - \frac{\tilde{y}^r(S) \tilde{y}^f(V)}{\alpha(S) \alpha(V)} \right] L_0^r \right. \\
\left. + \frac{\tilde{y}^f(V) \tilde{y}^f(M)}{\alpha(V) \alpha(M)} L_0^f \right\} \]

\[ L_0^r(V, [T, r, f]) = \left[ \Delta_T^f \right]^{-1} \left\{ \left[ \frac{\tilde{y}^r(M)}{\alpha(M)} \frac{\tilde{y}^f(M)}{\alpha(M)} + \frac{\tilde{y}^r(S) \tilde{y}^f(M)}{\alpha(S) \alpha(M)} - \frac{\tilde{y}^r(S) \tilde{y}^f(V)}{\alpha(S) \alpha(V)} \right] L_0^r \right. \\
\left. + \frac{\tilde{y}^r(M) \tilde{y}^r(S)}{\alpha(M) \alpha(S)} L_0^r \right\} \]

\[ L_0^r(M, [T, r, f]) = \left[ \Delta_T^f \right]^{-1} \left\{ \left[ \frac{\tilde{y}^r(M)}{\alpha(M)} + \frac{\tilde{y}^r(S)}{\alpha(S)} \right] \frac{\tilde{y}^f(V)}{\alpha(V)} L_0^r - \frac{\tilde{y}^r(M) \tilde{y}^r(S)}{\alpha(M) \alpha(S)} L_0^r \right\} \]
Chapter 3

Employment Protection: Tough to Scrap or Tough to Get?

Differences in employment protection across countries appear to be quite persistent over time. One view of this persistence is that high employment protection creates a mass of workers in favor of maintaining high protection because deregulation would mean that they would lose their jobs. This mechanism is referred to as the constituency effect by Saint-Paul (2000). According to this view, employment protection is a policy that is difficult to deregulate.

In this chapter I will examine a different view of the aforementioned persistence, namely that employment protection is a policy which is difficult to introduce. Why may that be the case? Consider an economy that currently has no employment protection, with a proposal to introduce employment protection on the table. In case the proposal is adopted, it appears reasonable to assume that firms have ample opportunity to adjust employment levels before employment protection actually comes into effect. They would have an incentive to dismiss some workers today to avoid problems with high employment protection in the future. Anticipating this, workers whose situation is already precarious may not find it in their best interest to support the proposal in the first place.

Recent work on the political economy of employment protection including Saint-Paul (2000, 2002b), Vindigni (2002) and chapter 1 of this thesis has examined the view that employment protection may exhibit a constituency effect, making it difficult to deregulate.
While line of research employs dynamic models of job creation and destruction, political
dynamics are very simplistic. A level of employment protection is inherited from the past.
The economy has a once and for all opportunity to change the level of employment pro-
tection. This opportunity is not anticipated. In particular, firms think that the old level
of employment protection will last forever and suddenly find themselves confronted with
a different level of employment protection, without a chance to prepare for the change in
regulation.

In this chapter I maintain the somewhat unsatisfactory assumption of unanticipatedness,
but I eliminate the common feature of previous work that firms have no chance to respond.
Specifically, I assume that after the new level of employment protection is decided upon
there is a short delay in implementation during which a firms have a last opportunity to
make dismissal decisions subject to the old level of employment protection.

The main result is that delayed implementation can give rise to multiple stable political
outcomes. In other words, a low level employment protection inherited from the past may
be confirmed in the political decision, while some high level of employment protection would
be confirmed as well.

The remainder of this chapter is organized as follows. The model is described in sec-
tion 3.1. In section 3.2 I solve for the economic equilibrium. Preferences for employment
protection for both immediate and delayed implementation are described and compared in
section 3.3. A numerical example in which delayed implementation gives rise to multiple
stable political outcomes is presented in section 3.4. Section 3.5 concludes.

3.1 Model

At each point in time there is a continuum of workers of mass one. Workers leave the labor
force at rate $p$ and the mass of leaving workers is replaced by new entrants. There are many
firms, and the production structure consists of many production units, each composed of
one worker and one firm.

Preferences. All agents have linear utility with discount rate $r$: the utility of a consump-
tion stream $C(t)$ is given by $\int_0^\infty e^{-rt}C(t)dt$. 

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Creation. A firm creating a new production unit must undertake a specific investment c. The model has “workers waiting at the gate”: there are no matching frictions, firms can hire workers instantaneously while workers have to wait. Unemployment arises due to the appropriation of specific quasi-rents by employed workers.

Production. The productivity of a new production unit is given by $y_0$. It falls at rate $g$ thereafter.

Destruction. Production units are destroyed exogenously if the worker leaves the labor force. In addition there is endogenous destruction. The worker is free to quit at any time. The firm is bound by mandatory employment protection, which is modelled as wasteful firing cost $F$ which the firm incurs when it dismisses the worker.

Wage Determination. At the time of creation the firm and the worker set a wage such that the surplus of the production unit is split with shares $(1 - \beta)$ and $\beta$, respectively. This wage is never renegotiated. This gives rise to privately inefficient separations. I assume that at the time of bargaining the firm can still walk away without having to pay the firing cost.\footnote{The model is very similar to Blanchard and Portugal (2001), which features both “workers waiting at the gate” and no wage renegotiation. However, they assume that bargaining takes place at the instant after the firm has hired the workers, so firing cost are already part of the outside option of the firm.} Privately inefficient separations are the reason why workers may like some degree of firing cost.

Politics. The economy inherits a level of firing cost $F_0$ from the past and at time $t = 0$ the economy is presumed to be in the steady state induced by this level of firing cost. At time $t = 0$ there is a once and for all opportunity to change the level of firing cost. The arrival of this opportunity is not anticipated. The new level of firing cost $F$ is determined by majority voting among workers. After the vote but before the new level of firing cost takes effect, firms have a last opportunity to fire workers subject to the old level of firing cost $F_0$.\footnote{The model is very similar to Blanchard and Portugal (2001), which features both “workers waiting at the gate” and no wage renegotiation. However, they assume that bargaining takes place at the instant after the firm has hired the workers, so firing cost are already part of the outside option of the firm.}
3.2 Economic Equilibrium

In this section I will solve for the equilibrium path of the economy after time $t = 0$, that is given the new level of firing cost $F$. The equilibrium obtained will also be used to calculate the steady state associated with the initial level of firing cost $F_0$.

3.2.1 Separation Decision

The utility of unemployed workers $U$ will be constant along the equilibrium path. Thus consider a production unit with current productivity $y$ and current wage $w$ operating given a constant utility of the unemployed. Let $y(y, w, F, U)$ be the productivity level at which separation occurs. If $w \leq rU$ the worker quits. If $y \leq w - rF$ then flow profits fall short of opportunity costs and the firm fires the worker. Thus

$$y(y, w, F, U) = \begin{cases} \max[w - (r + p)F, 0], & w > (r + p)U, \\ y, & w \leq (r + p)U. \end{cases}$$

The part of the value of the production unit received by the firm is given by

$$J(y, w, F, U) = \begin{cases} J(y, w, F), & w > (r + p)U, \\ 0, & w \leq (r + p)U. \end{cases}$$

where

$$J(y, w, F) = \frac{y}{r + p + g} - \frac{w}{r + p + g} \left[ \max[w - (r + p)F, 0] - \frac{w}{r + p + F} \left( \frac{y}{\max[w - (r + p)F, 0]} \right)^{-\frac{r + p}{g}} \right].$$

The utility of the worker is given by

$$W(y, w, F, U) = U + \max \left\{ \left[ \frac{w}{r + p} - U \right] \left[ 1 - \left( \frac{y}{\max[w - (r + p)F, 0]} \right)^{-\frac{r + p}{g}} \right], 0 \right\}.$$  

3.2.2 General Equilibrium

In equilibrium it must be the case that $w > (r + p)U$, so the equilibrium wage can be determined from the equation $J(y_0, w, F) = c$. I assume that $J(y_0, w, F) = c = \frac{y_0}{r + p + g} - c >$
0. Then the left hand side is positive for \( w = 0 \), decreasing in \( w \) and equals \(-F\) for \( w = y_0 + (r + p)F \). Thus there is a unique solution \( w(F) \in (0, y_0 + (r + p)F) \). In particular, for \( F \geq \bar{F} = \frac{y_0}{r + p + q} - c \) the solution is given by \( w(F) = (r + p) \left( \frac{y_0}{r + p + q} - c \right) \). Implicit differentiation yields

\[
w'(F) = -\frac{\left( \frac{\text{max}[w-(r+p)F,0]}{y} \right)^{\frac{r+p}{q}}}{\frac{1}{r+p} \left[ 1 - \left( \frac{\text{max}[w-(r+p)F,0]}{y} \right)^{\frac{r+p}{q}} \right]} \leq 0
\]

with strict inequality if \( F < \frac{y_0}{r + p + q} - c \). With some abuse of notation, let \( y(F) \) be the equilibrium separation productivity, that is

\[
y(F) \equiv \text{max}[w(F) - (r + p)F, 0].
\]

It is decreasing in \( F \) for two reasons: higher firing cost directly delay separation and in equilibrium they reduce the wage which also acts to delay separation. It is strictly decreasing for \( F < \bar{F} \) and equals zero for higher levels of firing cost.

The surplus of a new production unit is given by \( c + W(y_0, w(F), F, U) - U \). A fraction \((1-\beta)\) of this surplus goes to the firm and must thus be equal to \( c \). This yields the condition

\[
W(y_0, w(F), F, U) - U = \frac{\beta}{1 - \beta} c.
\]

Solving for the utility of the unemployed yields

\[
U(F) = \frac{w(F)}{r + p} - \left[ 1 - \left( \frac{y(F)}{y_0} \right)^{\frac{r+p}{q}} \right]^{-1} \beta \frac{\beta}{1 - \beta} c.
\]

The hiring rate is obtained from the equation

\[
(r + p)U(F) = h \frac{\beta}{1 - \beta} c
\]

and thus given by

\[
h(F) = \frac{1 - \beta}{\beta} \frac{(r + p)U(F)}{c}.
\]
3.2.3 Steady State induced by $F_0$

Production units are destroyed endogenously when reaching the separation productivity $y(F_0)$ and exogenously at rate $p$ due to workers leaving the labor force. The overall destruction rate is

$$d(F_0) = \frac{p}{1 - \left(\frac{y(F_0)}{y_0}\right)^{\frac{\rho}{\kappa}}}.$$

Steady state employment is

$$L(F_0) = \frac{h(F_0)}{h(F_0) + d(F_0)}.$$

In the next section I will examine the preferences over employment protection of workers at different percentiles in the productivity distribution, so it will be useful to compute what these percentiles are. Let $y_\pi(F_0)$ be the $\pi$th percentile of the productivity distribution if initial firing cost are $F_0$. Unemployed workers will be included in the productivity distribution by assigning them a productivity level $u < 0$. Thus $y_\pi(F_0) = u$ for $\pi \leq 1 - L(F_0)$. For $\pi > 1 - L(F_0)$

$$y_\pi(F_0) = \left[1 - \frac{1 - \pi}{L(F_0)} \left(1 - \left(\frac{y(F_0)}{y_0}\right)^{\frac{\rho}{\kappa}}\right)\right]^{\frac{\kappa}{\rho}} y_0.$$

3.3 Preferences over Employment Protection

In this section I will determine the preferences of workers over the new level of firing cost set by majority voting at time $t = 0$. As a benchmark I will discuss preferences over employment protection if the new level of firing cost takes effect immediately. This is done in subsection 3.3.1. Then in subsection 3.3.2 I examine how preferences change when there is a short delay in implementation allowing firms a last dismissal decision subject to the old level of firing cost.

3.3.1 Immediate Implementation

If the new level of firing cost is implemented without delay, an employed worker need not worry that he will be dismissed if there is a large hike in firing cost. The worker only needs to worry about becoming unemployed if firing cost are lowered to a level insufficient to deter the firm from firing him.
Consider an initial level of firing cost \( F_0 \leq \bar{F} \). The employed worker’s current wage is given by \( w(F_0) \). Since the worker is employed the productivity of the production unit must satisfy \( y \geq y(F_0) = w(F_0) - (r + p)F_0 \). The separation productivity for workers receiving the wage \( w(F_0) \) under the new level of firing cost is given by

\[ y(F, F_0) = \max[w(F_0) - (r + p)F, 0] \]

Thus a worker in a production unit with productivity \( y \geq 0 \) will be dismissed if and only if

\[ y < E(y, F_0) \]

where

\[ E(y, F_0) = \frac{w(F_0) - y}{r + p} = F_0 - \frac{y - y(F_0)}{r + p} \leq y. \]

Clearly \( E(y, F_0) \leq F_0 \) for \( y \geq y(F_0) \), that is currently employed workers only need to be worried about dismissal if firing cost are reduced. Having defined this threshold, the utility of an employed worker at time \( t = 0 \) can be written as

\[
W_I(y, F, F_0) = \begin{cases} 
U(F), & 0 \leq F < E(y, F_0), \\
U(F) + \max \left\{ \left[ \frac{w(F_0)}{r + p} - U(F) \right] \left[ 1 - \left( \frac{y}{y(F, F_0)} \right)^{-\frac{r + p}{g}} \right], 0 \right\}, & F \geq E(y, F_0).
\end{cases}
\]

For unemployed workers simply set \( W_I(u, F, F_0) = U(F) \).

Figure 1 provides an illustration of the shape of preferences in this case for an intermediate level of initial firing cost \( F_0 = \frac{1}{2} \bar{F} \).\(^{2}\) The dashed line shows the utility of a worker in a production unit with maximal productivity \( y_0 \). This worker need not fear dismissal even if firing cost are reduced to zero. The dotted line shows the utility of an unemployed worker. More interesting is the utility of a worker in a production unit with productivity at the 25th percentile, given by the solid line. If the new level of firing cost is sufficiently below \( F_0 \), then this worker will be dismissed and his utility coincides with that of unemployed workers.

\(^{2}\) The parameters are \( r = 0.04, p = 0.03, g = 0.05, y_0 = 1, c = 2 \) and \( \beta = 0.3 \) and will later be used to provide an example of multiple stationary equilibria.
3.3.2 Implementation Delay

Now firms a given a last chance to dismiss subject to the old level of firing cost before the new level is implemented. As a consequence, employed workers not only need to worry about being dismissed when firing cost are reduced too much, in addition they must be concerned with becoming unemployed if there is a large hike in firing cost.

Consider an initial level of firing cost $F_0 \leq \bar{F}$ and a worker employed in a production unit with productivity $y$. The goal is to derive the threshold $\bar{F}(y,F_0)$ beyond which the firm will seize its last chance to dismiss at the old level of firing cost. The value obtained from not dismissing the worker is given by $J(y,w(F_0),F)$, thus dismissal is optimal if

$$J(y,w(F_0),F) < -F_0.$$ 

As the worker is employed, productivity $y$ satisfies $y \geq y(F_0)$ and

$$J(y,w(F_0),F_0) \geq -F_0,$$

i.e. the worker will not be dismissed at the old level of firing cost $F_0$. Now consider
$J(y, w(F_0), F)$ as the new level of firing cost $F$ increases. The value of retaining the worker falls until firing cost reach $\bar{F}(F_0) = \frac{w(F_0)}{r}$, at which point firing cost are sufficiently large such that it is no longer optimal to dismiss a worker earning $w(F_0)$ even if productivity is zero. If Notice that since $\bar{F} = \frac{w(F)}{r + p}$ and $w(F)$ is decreasing it follows that $\bar{F}_0 \geq \bar{F} \geq F_0$. If

$$J(y, w(F_0), \bar{F}(F_0)) = \frac{y}{r + p} - \frac{w(F_0)}{r + p} < -F_0$$

(3.2)

then there is a unique is a unique $\bar{F}(y, F_0) \in [F_0, \bar{F}(F_0)]$ such that

$$J(y, w(F_0), \bar{F}(y, F_0)) = -F_0.$$

If condition (3.2) set $\bar{F}(y, F_0) = +\infty$. For $F > \bar{F}(y, F_0)$ the firm will seize the opportunity and fire the worker before the new level of firing cost becomes effective.

Having constructed this additional threshold, the utility of an employed worker at time $t = 0$ can be written as

$$W_D(y, F, F_0) = \begin{cases} U(F), & F \leq \bar{F}(y, F_0), \\ U(F) + \max \left\{ \left[ \frac{w(F_0)}{r + p} - U(F) \right] \left[ 1 - \left( \frac{y}{y(F, F_0)} \right)^{-\frac{r + p}{g}} \right], 0 \right\}, & \bar{F}(y, F_0) \leq F \leq \bar{F}(y, F_0), \\ U(F), & F > \bar{F}(y, F_0). \end{cases}$$

(3.3)

where $y(F, F_0) = \max[w(F_0) - (r + p)F]$ is the separation productivity for a worker receiving a wage $w(F_0)$ when the firing cost is $F$. For unemployed workers simply set $W_D(u, F, F_0) = U(F)$.

Figure 2 is the analog of Figure 1. A worker in a production unit with maximal productivity $y_0$ will retain his job no matter how large the hike in firing cost. This is not the case for a worker in a production unit at the 25th percentile. If the new level of firing cost is sufficiently large the firm will dismiss the worker and the worker’s utility coincides with that of the unemployed. Notice that utility is continuous at the lower threshold $\bar{E}(y, F_0)$. Being slightly to the right of this threshold means remaining employed at the wage $w(F_0)$ for a very short time, which is not much better than being unemployed. On the other hand,
utility is discontinuous at the upper threshold $\bar{F}(y, F_0)$. A worker slightly to the left of this threshold barely escapes dismissal at time $t = 0$, but taking this hurdle means benefiting from the new higher level of firing cost, which is much better than being unemployed.

### 3.4 An Example of Multiple Stationary Equilibria

A level of firing cost $F$ is a political equilibrium given initial firing cost $F_0$ if it is a Condorcet winner. Let $C(F_0)$ be the set of Condorcet winners for initial firing cost $F_0$. If two Condorcet winners give the same level of utility to all workers, only the lower one will be included in the set $C(F_0)$, in order to eliminate meaningless multiplicity. A level of firing cost $F_0$ is a stationary political equilibrium if $F_0 \in C(F_0)$. The set of Condorcet winners with immediate implementation is denoted as $C_I(F_0)$ while the corresponding set with delayed implementation is denoted as $C_D(F_0)$.

The purpose of this section is to present a numerical example in which $C_I(F) = C_I(\bar{F}) = \bar{F}$ for all $F \geq 0$ while $C_D(0) = \{0\}$ and $C_D(\bar{F}) = \{\bar{F}\}$. Under immediate implementation $\bar{F}$ is the unique stationary equilibrium. Delayed implementation gives rise to multiplicity: $\bar{F}$ is still a stationary equilibrium, but in addition zero firing cost turns out to be second
stationary equilibrium. That is, $\bar{F}$ is the unique stationary equilibrium under immediate implementation and delayed implementation gives rise to multiple stationary equilibrium: given zero initial firing cost, zero firing cost are the unique political equilibrium. The parameters used in the example are $r = 0.04$, $p = 0.03$, $q = 0.05$, $y_0 = 1$ (this is a normalization), $c = 2$ and $\beta = 0.3$.

In Figure 3 I consider the case of initial firing cost $F_0 = \bar{F}$. The wage of employed workers is $w(\bar{F}) = (r + p)\bar{F}$, so condition (3.2) is violated for all productivity levels $y \geq 0$. It follows that $\bar{F}(y, \bar{F}) = +\infty$ for all $y \geq 0$: increasing firing cost beyond $\bar{F}$ cannot induce firms to dismiss workers. Thus the distinction between immediate and delayed implementation is immaterial here, that is $W_D(y, F, \bar{F}) = W_I(y, F, \bar{F})$ for all $y \geq 0$ and $F \geq 0$. The solid line in Figure 2 shows the utility of a worker with median productivity. For low levels of $F$ the firm chooses to dismiss the worker after the reduction in firing cost has taken effect, so the worker receives the utility of being unemployed. Once firing cost reach $E(y, \bar{F})$, the worker retains his job. Utility is increasing in $F$. This reflects the trade-off between longer job duration and lower utility when becoming unemployed (actually close to $\bar{F}$ the utility of the unemployed also becomes increasing in $F$). To the right of $\bar{F}$ the worker is never dismissed and receives the wage $w(\bar{F})$ until leaving the labor force, so utility is $\frac{w(\bar{F})}{r + p} = \bar{F} = \frac{-y_0}{r + p + q} - c$. 118
The median worker’s preferred level of firing cost is $F$. The dashed line shows utility of a worker with productivity $y_0$. This worker is not at risk of becoming unemployed if firing cost are very low. His preferred level of firing cost is also $F$. It is then clear that $F$ is the maximizer for all employed workers. Since the median worker is employed, it follows that $F$ is the unique Condorcet winner. Notice that parameters are such that it is always better to be employed with full protection against dismissal than to be unemployed (no matter for what level of firing cost one is unemployed). It is easy to check that this condition is necessary and sufficient for $F$ to be a stationary equilibrium.\(^3\) In Figures 4 and 5 I consider the case of initial firing cost $F_0 = 0$. Since firing cost are already zero, it is not possible for a further reduction in firing cost to induce job loss, hence $E(y, 0) = 0$ for all $y \geq y(0)$. Figure 4 shows that under immediate implementation $\bar{F}$ is still the unique Condorcet Winner.

However, if implementation is delayed, then an increase in firing cost may induce firms to seize their last opportunity to dismiss their workers without having to pay a firing cost.

\(^3\)From (3.3) it is clear that utility is either $U(F)$ or a linear combination of $U(F)$ and $\frac{w(F_0)}{r + p}$. If $\frac{w(F_0)}{r + p} > \max_{F \in [0,F]} U(F)$, then all employed workers prefer $\bar{F}$ which guarantees utility $\frac{w(F_0)}{r + p}$. Conversely, if $\frac{w(F_0)}{r + p} \leq \max_{F \in [0,F]} U(F)$, then all workers (including the unemployed) vote for the maximizer of $U(F)$. 

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The solid line in Figure 4 plots the utility of a worker with median productivity $y_{0.5}(0)$ as a function of the new firing cost $F$. If the new level of firing cost is small this worker remains employed. Over this range an increase in firing cost extends prolongs the worker’s current job but reduces the utility received by the worker upon being dismissed. The balance of these two effects turns out to be negative. As the new level of firing cost increases, it eventually reaches the threshold $\bar{F}(y_{0.5}(0), 0)$ at which it becomes optimal for the firm to dismiss the worker. Beyond this threshold the worker simply receives the utility of the unemployed. For this worker $F = 0$ is the preferred new level of firing cost. To indicate how preferences look for workers with productivity below the median, the dashed line shows utility for the worker with productivity $y_{0.4}(0)$. Since the production unit is less profitable, the threshold $\bar{F}(y_{0.4}(0), 0)$ at which the firm prefers to dismiss the worker is lower than the corresponding threshold for the median worker. Again $F = 0$ is the preferred level of new firing cost. The dotted line shows the utility of unemployed workers. For all workers with productivity below the median $F = 0$ is the unique global maximizer, which implies that it is the unique Condorcet winner. Finally, the dash-dotted line shows the utility of a worker in a production unit with maximal productivity. This unit is sufficiently profitable such that the firm wants to keep the worker no matter how high the new level of firing cost.
Also, because separation is more remote, the tradeoff between job prolongation and lower utility upon dismissal is more favorable for this worker and quickly turns positive. The maximizer for this worker is $F = \bar{F}$.

3.5 Conclusion

The political dynamics employed in recent research on the political economy of employment protection are somewhat unsatisfactory. In particular, the opportunity to change the extent of employment protection arises unanticipated and firms suddenly find themselves confronted with a new level of regulation. It would be desirable to abandon the device of unanticipatedness. Models doing so will probably allow firms to prepare for changes in regulation in some way or another. Moreover, it seems a priori plausible that firms have some ability to do so in practice. In this chapter I took a preliminary step, maintaining unanticipatedness but giving firms a chance to make a last round of dismissal decisions before the new level of regulation is implemented. I demonstrated that delayed implementation may give rise to a situation in which both high and low employment protection are stable political outcomes. In the low protection equilibrium, employment protection is never introduced because workers are concerned that firms will respond with dismissal before protection actually takes effect. In this sense employment protection is a policy that is tough to introduce. It would be interesting to extend this analysis to see under what circumstances one would expect employment protection to be introduced (e.g. in good or bad times), and to see whether predictions from such an analysis are in line with the actual experience of countries introducing employment protection.
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